GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXIV. No. 3154.] LONDON, OCTOBER 24, 1923. [75TH YEAR. PRICE 1s.

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THE Simon-Carves-Rincker Process FOR

COMPLETE GASIFICATION
BLUE WATER GAS OR
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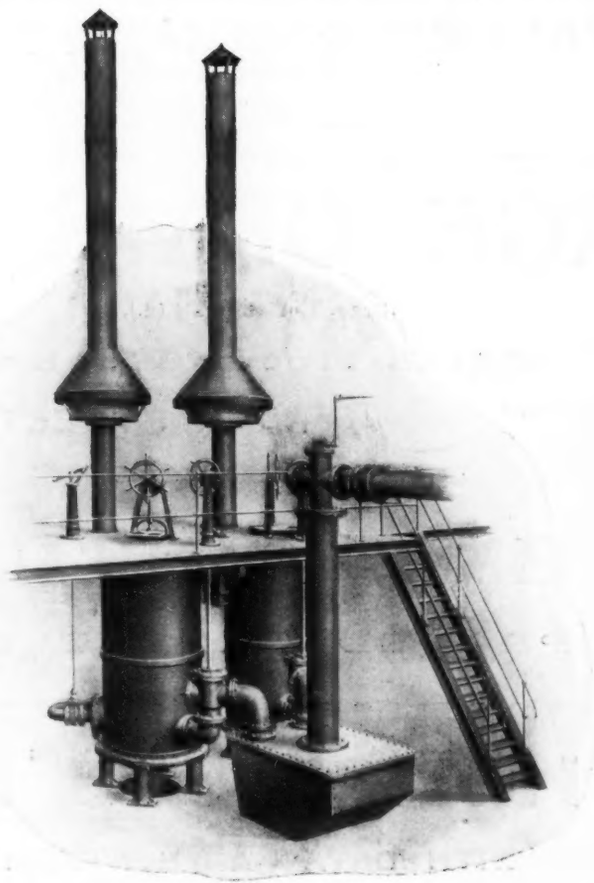

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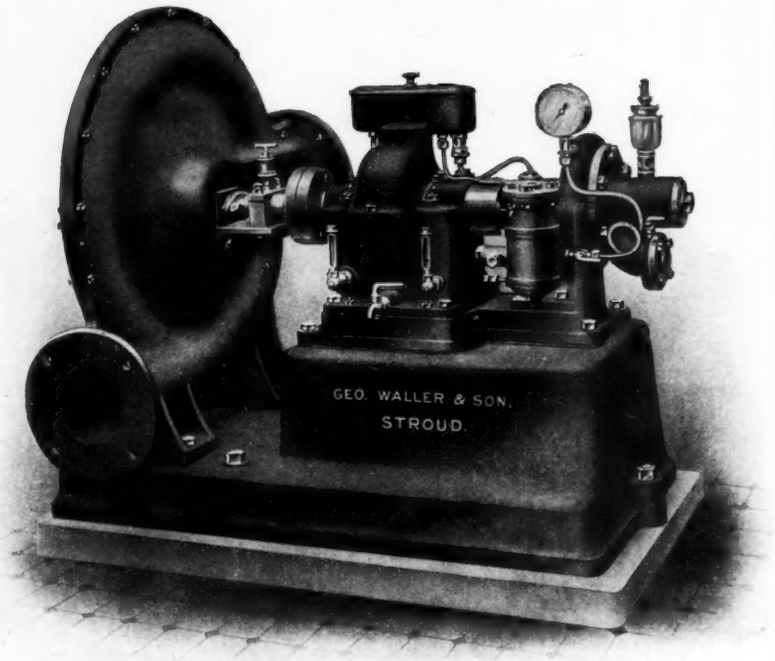

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These Meters are giving Universal Satisfaction wherever adopted.

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Encourage Better Shop-Lighting by offering Hire and Hire-Purchase Terms

Well-lighted Shopping Areas have a wonderful influence on the prosperity and general tone of a town or borough. Well-lighted shops attract buyers by their cheery brightness and their atmosphere of enterprising service; incidentally the customers get to appreciate the advantage of good lighting and gradually demand it in their own homes.

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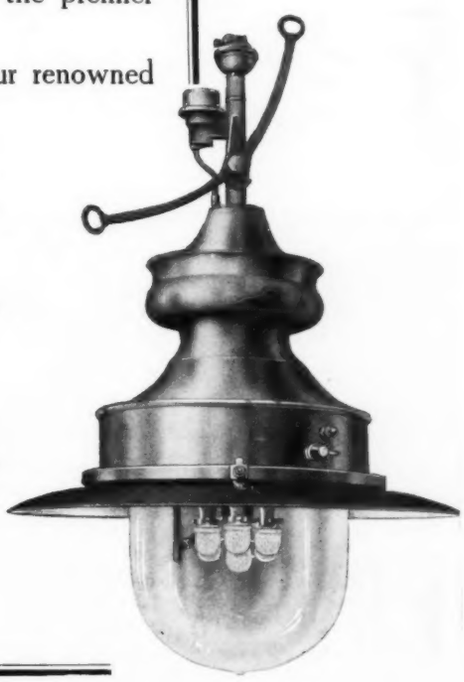

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The Lamp which gets the last lighting unit out of every foot of gas.

70 to 1,500 c.p.

Illustration shows Distant Control Device fitted.

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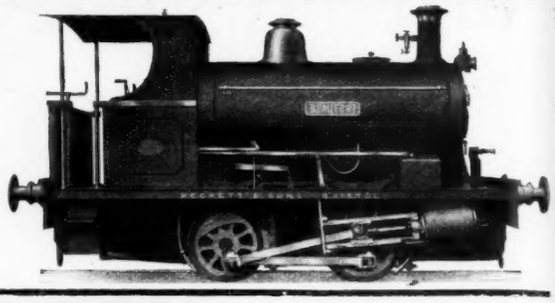

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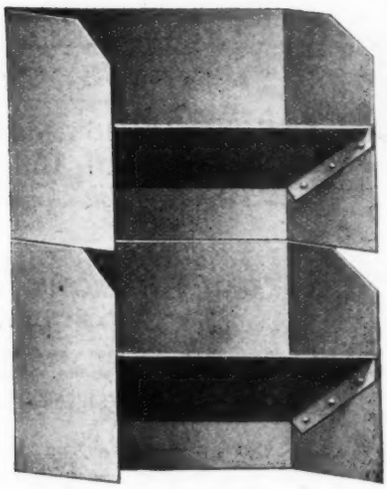

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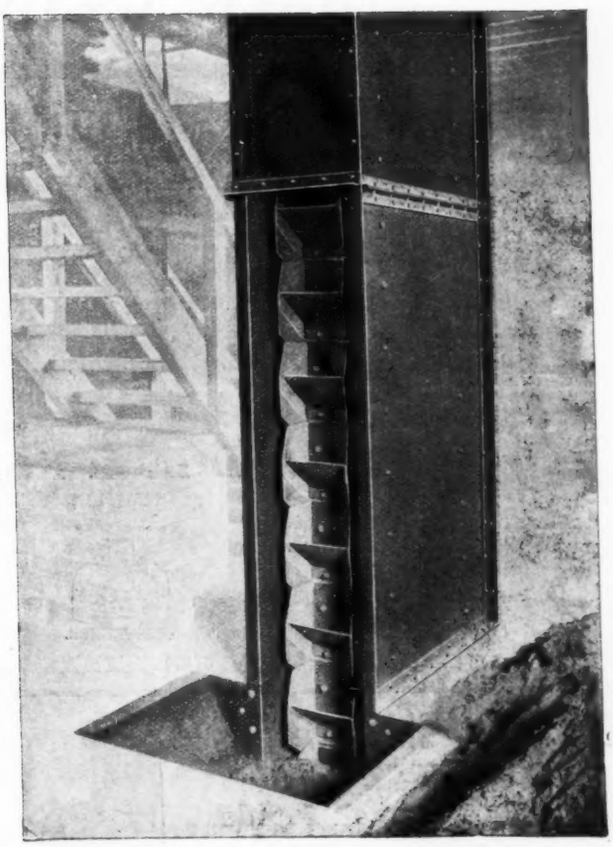

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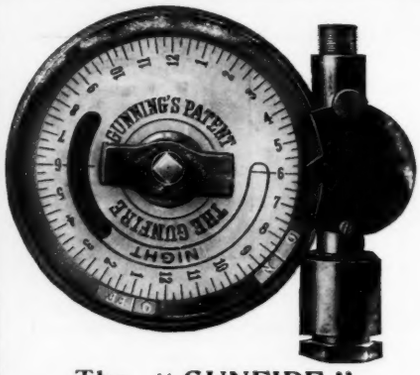

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THE BEST IS ALWAYS THE CHEAPEST
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So will you be if you examine the quality of the clockwork.

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F.A. MULTIPLE STROKE MACHINE

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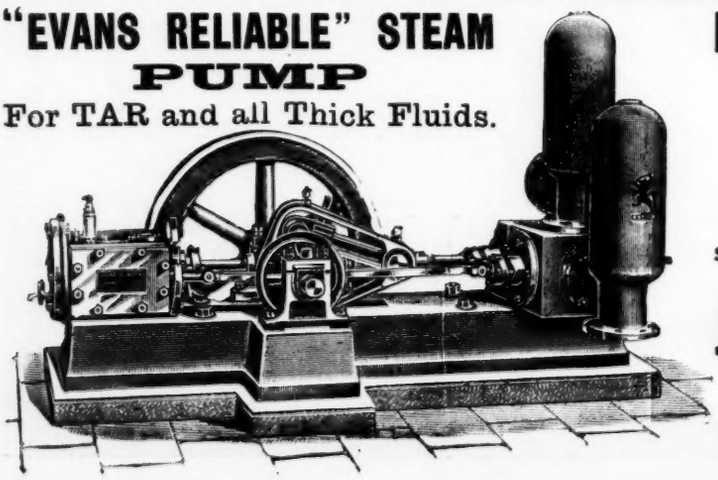

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Glover-West Installation
is manufactured at the
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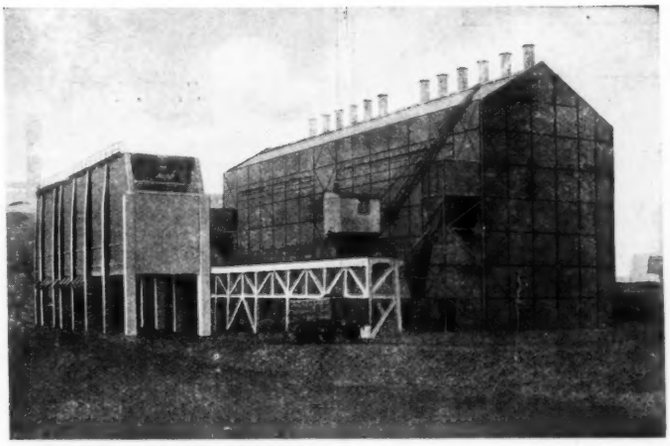

Glover-West Vertical Retorts at the
Greenbank Gas Works of the
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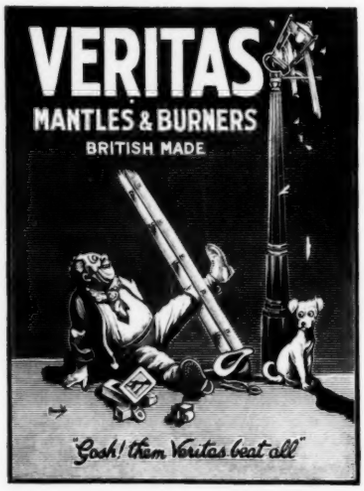

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We shall be happy to supply advertising material to link you up with the campaign.

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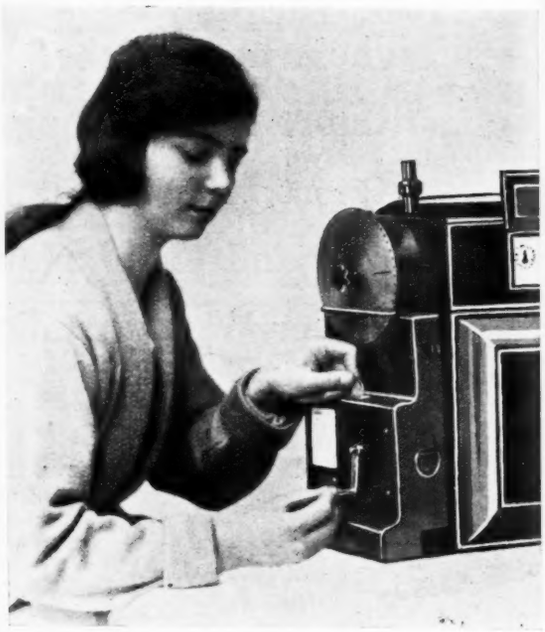
For All Types of Prepayment Meters.



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"Standard" Centrifugal Washers
For Extraction of Ammonia, Toluol, Cyanide, Benzol, Naphthalene, etc., from Coal and Other Gases.

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Note:—Repeat order received for two machines for this Station, and one in use at Saltley Station.

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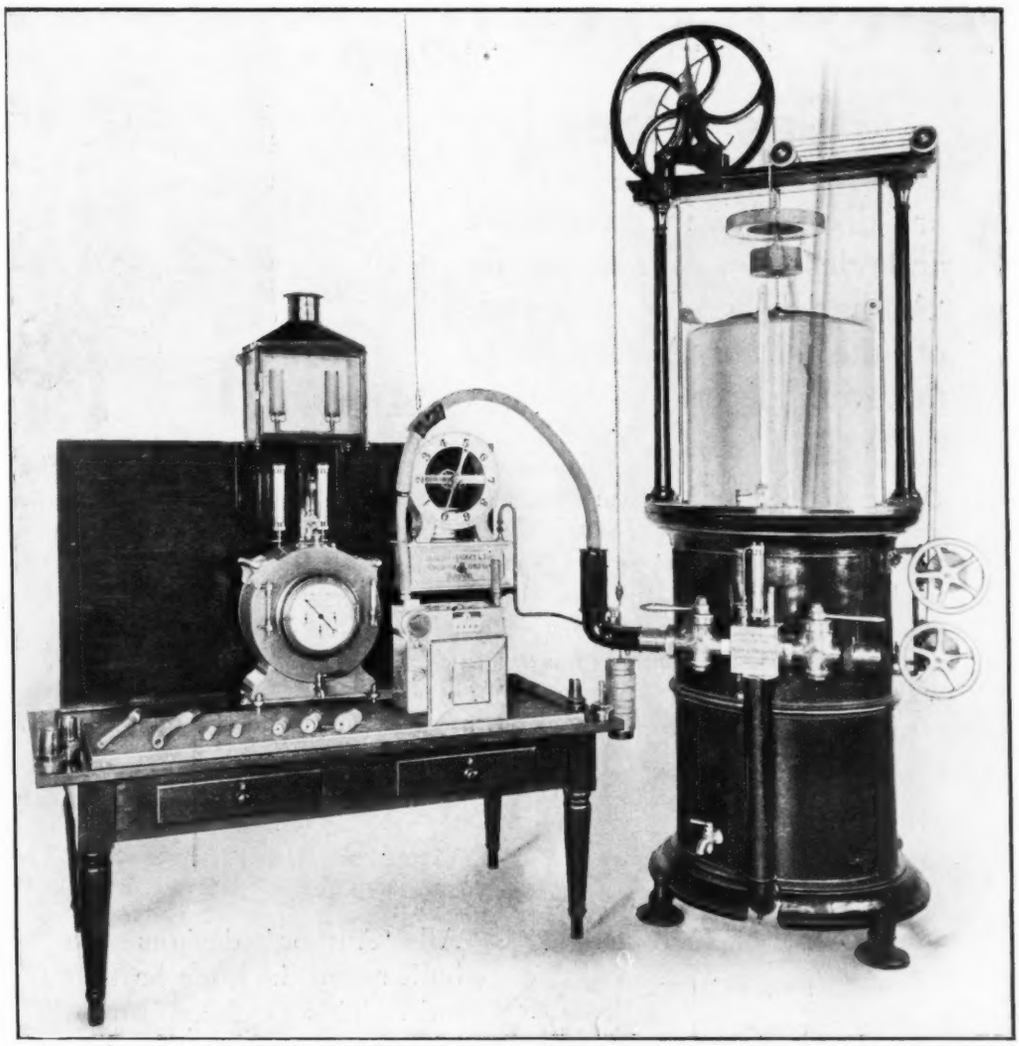
MANUFACTURERS of GAS METERS and TESTING APPLIANCES, and GAS ENGINEERS.

Complete Sets of Gas Test Holders to meet Board of Trade Requirements.



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SUPPLIED WITH CAST IRON TANK. THE BELL IS MADE OF ANTI-CORROSIVE WHITE METAL.

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Gas Fires

are distinctive in appearance and design. There is an 'Author' design for every style of suite and an 'Author' finish for every decorative scheme.

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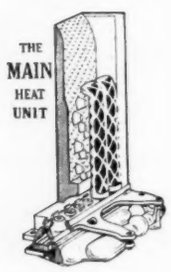
with boiling burner in trivet.

Owing to their smooth surfaces and the absence of all unnecessary ornamentation, the 'Author' Fires are easy to clean and to keep clean They burn with a silent flame, heat up quickly and give the maximum of service with the minimum of gas consumption.



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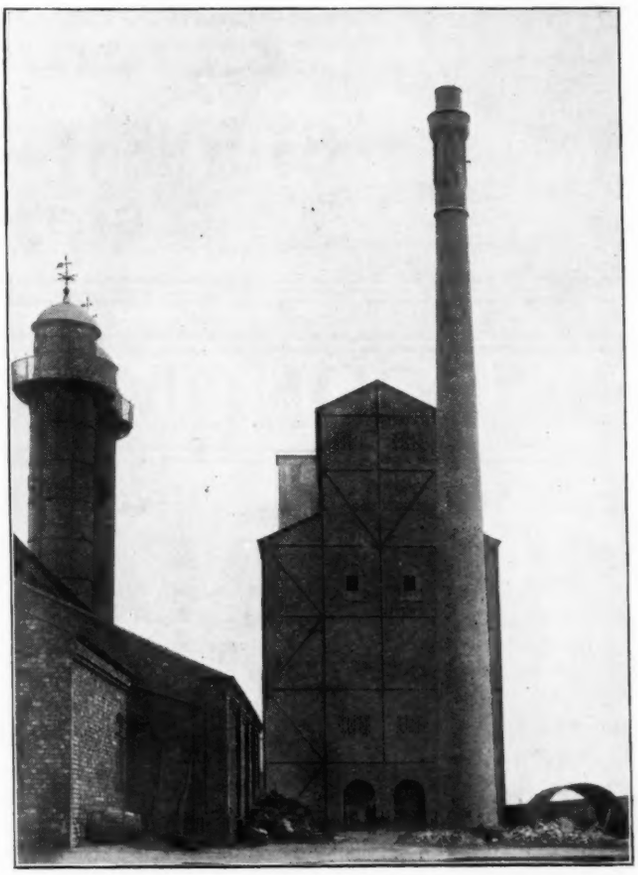

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SELF-OILING ROPE PULLEYS.

"LAWRENCE" PATENT.

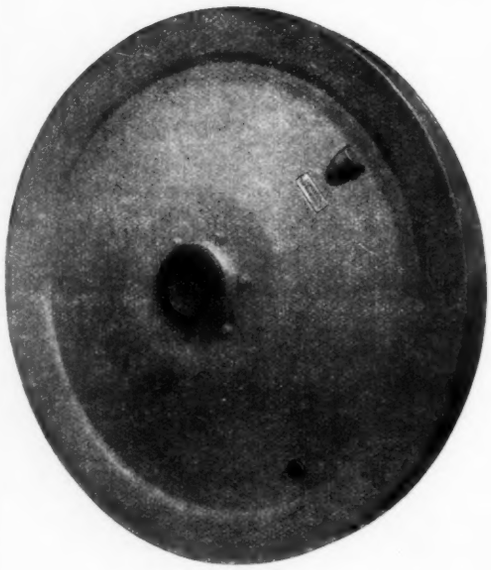

Fig. 1286.

MADE OF PRESSED STEEL AND CHEAPER THAN ORDINARY STEEL PULLEYS.

OIL CAPACITY HAS PROVED SUFFICIENT FOR 12 MONTHS WITHOUT REFILLING.

NO LOOSE PARTS.
LIGHT AND STRONG.

STOTHERT & PITT, LTD.,
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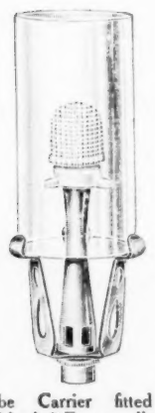
Welsbach "ECONOMY" Burner



Globe Carrier fitted to Welsbach "Economy" Burner and carrying special Clear Glass Chimney.

DESIGNED to meet the pressing demand for reduced gas bills, the Welsbach "Economy" Burner is ideal for use in Halls, Bathrooms, Lavatories, &c., where a full-sized burner is unnecessary and extravagant. It gives a brilliant light, sufficient for any of the purposes mentioned. Burning on an average three hours each day, the Welsbach "Economy" Burner and Mantle costs only 4½d. per month for gas, using gas at 9d. per therm.

¶ This Burner has found great popularity with many of the largest Lighting Authorities throughout the British Isles owing to its extreme gas economy and ornamental lighting effects.

Globe Carrier fitted to Welsbach "Economy" Burner and carrying an ordinary inverted Bijou Globe.

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P.P.S. 269

Steam Driven Pumps.

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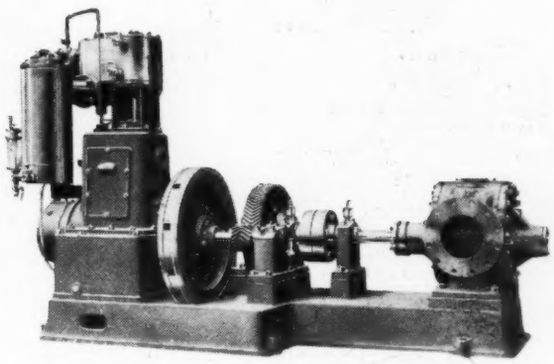
We are makers of Steam and Electrically Driven Gas Works Pumping Plant for a wide range of duties, including the handling of tar and ammoniacal liquor, and oils of varying viscosity, also water service and circulating Pumps



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VOLKER GAS MANTLES

BRITISH MADE.

Make them the best for all street lighting and maintenance work

May we send you samples?

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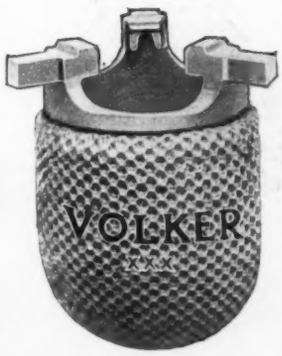
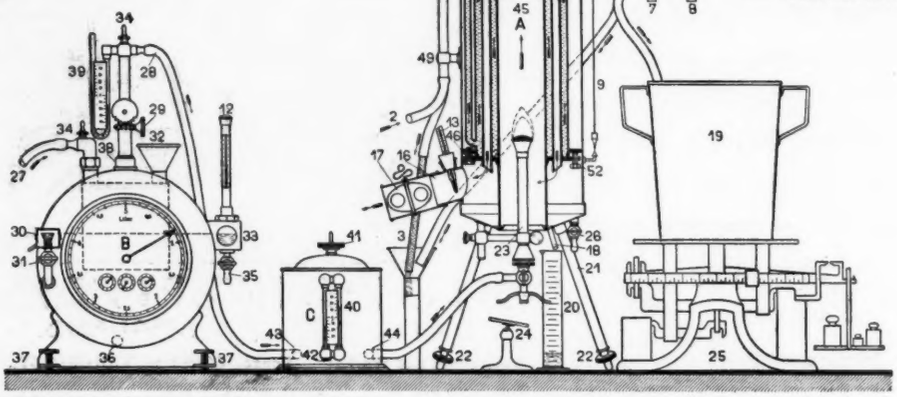


Sectional Description of the JUNKERS Calorimeter

1. Water regulating cock
2. Cold water connection
3. Connection for draining water from overflow
4. Water overflow arrangement
5. Warm water discharge
6. Distribution discharge
7. Connection (branch) for measuring water
8. Connection (branch) for waste water
9. Plumb line
10. Thermometer 1/10° C. cold
11. " 1/10° C. warm
12. " 1/1° C. gas
13. " 1/1° C. exhaust gases
14. Reading off glasses
15. Vent pipe
16. Exhaust gas branch
17. Throttle valve
18. Condensation water branch
19. Measuring vessel, large
20. " " small
21. Legs
22. Adjusting screws
23. Burner with foot
24. Standing mirror
25. Balance and weights
26. Drain cock
27. Gas inlet to meter

IN STOCK.

28. Gas outlet from meter
29. Gas regulating cock
30. Level overflow
31. Cock for same
32. Filling funnel
33. Box and sight glass
34. Vent cocks
35. Drain cock
36. Draining screw
37. Adjusting Screws
38. Spirit level
39. Pressure gauge for gas
40. " "
41. Loading (pressure adjusting) discs
42. Draining screw
43. Gas inlet to pressure regulator
44. Gas outlet to " "
45. Tube Heater
46. Flange bolts
47. Water Mixer
48. Screw connection to cock 1
49. Screw to side stay
50. Screw connection to overflow 5
51. Thermometer screw connections
52. Press screws to flange ring



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THE ECONOMY OF

"Supastone"

THREE-PLY GLASS

FOR SHOPS, HOTELS, OFFICES, THEATRES and DOMESTIC LIGHTING.

IS THREEFOLD

1. It gives more light with no glare to injure the eyes
   (This means a saving in gas and health)
2. It is the cheapest article on the market
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3. It is very neat and easy to clean
   (This means a saving in labour)

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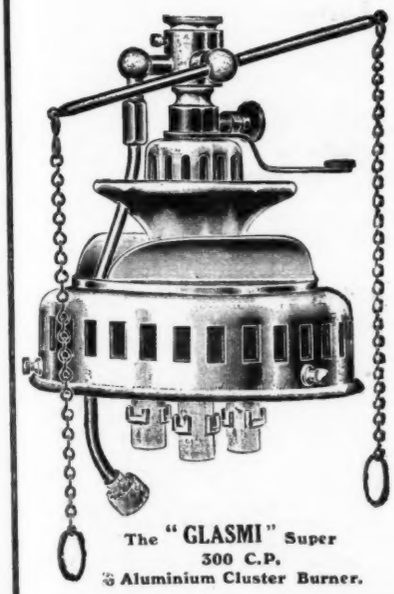
SMITH'S for SERVICE

Everything for **Lighting, Heating, Cooking.**



The "GLASMI" Super 300 C.P. 3 Aluminium Cluster Burner.

WHATEVER YOUR REQUIREMENTS
May be in
GAS APPLIANCES
We can deal with them
PROMPTLY
and to
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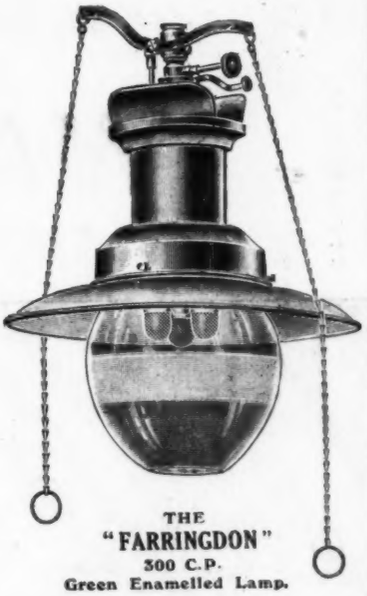

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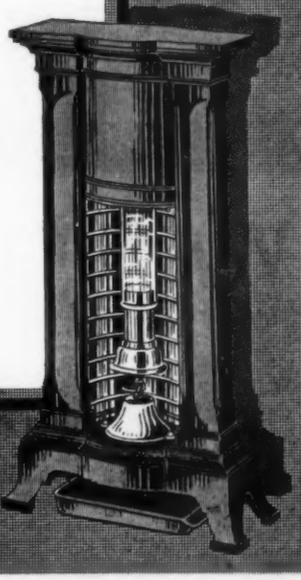

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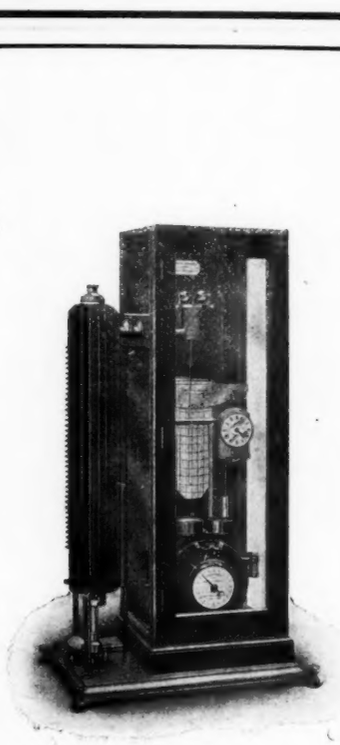

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VOL. CLXIV., No. 3154.] WEDNESDAY, OCTOBER 24, 1923. [75TH YEAR.

EDITORIAL NOTES.

The Tale of the Therm Told in America.

INFORMATION regarding the therm has been carried to America by Dr. E. W. Smith. The American Gas Association did him the honour of asking him to lecture to them, at their Annual Convention last week, on the subject of "Experiences with the Therm in England;" and the honour was one he could not decline. The lecture has been delivered; and it was an honest portrayal of the lecturer's personal views, which, we are afraid, are too much of the *via media* order to enable our American friends to utilize them to any great extent as a basis for formulating judgment upon the value or otherwise of the therm system. It would have been possible to send from this country—say two other men, to accompany Dr. Smith, one of whom might have been just as strongly *pro*-therm, as the other was antagonistic. But Dr. Smith having been heard, we would suggest to our American friends that they should mark well two passages in his lecture, and then sturdily resolve to keep open minds until they can get into closer touch with concrete facts representing actual results. In the early part of the deliverance, the lecturer says: "The "change has taken place so recently that it is quite impos- "sible, and certainly inadvisable, to come to any definite "conclusions as to what has been the effect of the introduc- "tion of the therm as a basis of charge for city gas." Despite this statement as to the "impossibility" and "inadvisability" of coming to definite conclusions, Dr. Smith remarked in his final passages: "You will have appreciated "that I am no enthusiast propounding the direct advantages "of the therm basis. It has given many indirect advantages "to both the consumer and the gas industry; but its adop- "tion was only warranted by the very special conditions and "chaos that held in Britain at the termination of the war." We challenge this last statement *in toto;* for it is obvious that, if the warrant only resided in the suggested causes, then the disappearance of the "special conditions and chaos" would equally warrant the discarding of the therm system. The foundation of that system—which is something more than a mere basis of charge—has in it far more to justify it than the "special conditions and chaos" of a particular and abnormal time.

But let no one think that we have misinterpreted Dr. Smith. He speaks very much in favour of the therm system; he finds in it a logical conclusion to the trend of events and developments within the industry. He is a friend, and not an enemy; but he is a friend who is a little uncertain as to the length that his friendship should go. There are equally plain indications that he feels that the therm is over-rated—that much of the advantage attributed to it could have been obtained by charging on the volumetric basis with a standard calorific value, and altering the consumer's charge with any variation of that value. That is precisely where one of the many points of usefulness of the therm comes in. It enables variations of calorific value per cubic foot to be made without any of the disorganization caused by altering standard and maximum prices and charges to the consumers, because, whatever the calorific value per cubic foot, and no matter the number of cubic feet that constitute a therm, the basis of 100,000 B.Th.U. remains a constant—always and everywhere. That is a valuable consideration; and it is only one of several that become more and more defined the farther experience of the therm system goes—experience both technical and commercial. As Dr. Smith indicates, before one can speak positively, one must have tangible effects as disclosed by experience; and experience means time, as an innovation of this kind cannot be made and the effects immediately mature. The therm must be looked upon as a means in our industrial evolution; and it is easy enough to see from the experience gained so far that it will indeed be a material factor in that evolution. Our Legislature would never have allowed such a measure of technical and commercial autonomy as is given to each undertaking, through the therm system, by the liberty to select and declare its own calorihc value per cubic foot, and, by complying with certain formalities, to alter that value as circumstances dictate, without a change which enabled the charge to the consumers to be based on a definite thermal quantity. There would have been, with that liberty, a fine confusion in respect of standard and maximum prices and appropriate charges to the consumer under any other system than a fixed thermal basis. That was proved by the decade of experience, normal and abnormal, which the gas industry had under the volumetric system with authorized calorific values such as obtained before the therm basis became well established under the powers conferred by the Gas Regulation Act. Nevertheless, Dr. Smith finds "only an aca- "demic value in reducing all gas sold in all undertakings to "the same common denominator;" we find several practical advantages.

A strange thing about the lecture is that Dr. Smith points out many of the advantages of the therm system, though not all, but does not appear to have marshalled them, and then sought to visualize, even in general form, the aggregate of advantage. If he had done this, it is probable he would have ended up his lecture on some other chord than—"You will have appreciated that I am no enthusiast "propounding the direct advantages of the therm basis." He told his audience of "the sequence of events which justified such a radical change." Mark the word "justified," and then dwell on the term "radical." It implies more than something based upon the temporary conditions of war and early peace times. Dr. Smith also says that in some areas prior to the war, even though gas was being supplied up to the standard, the practical results obtained were becoming less and less satisfactory. Those were days of charging on the volumetric basis and standard calorific power; but the basis of charge had nothing to do with the less satisfaction in use. The reduced satisfaction was due to the want of education of the consumers in the matter of regulation, or to the use of appliances without the means of adjustment to changed quality. In improvement in this direction, the therm system is having a very substantial and direct salutary effect, which will be of permanent and immense value to the consumer. Changes are being made to higher efficiency appliances, to all burners being adjustable, and to a higher education and efficiency of the sales staffs of undertakings; and inspection, regulation, and maintenance of consumers' appliances is a growing policy. The view of many men in the industry is that there are "psychological effects" in economy and efficiency, and in the total of a consumer's account, of more far-reaching importance than the knowledge that the price of gas per 1000 c.ft. is to be reduced on a change of declared calorific value per cubic foot. Not only "psychological" but practical effects should be considered where the consumer is concerned.

To proceed, Dr. Smith renders to Sir George Beilby and the Fuel Research Board the honour due to them for the solution of a most difficult problem. He also acknowledges

that the gas industry was fretting under irksome restrictive legislation, and was demanding greater flexibility of regulations, while not desiring that the consumers' interests should be less protected. As a matter of fact, greater freedom for the industry demands the strengthening of the protection of the consumers; and the industry, being mindful of the fact that freedom which would give greater latitude in their producing operations would be a commercial advantage both to gas undertakings and the consumers, was not at all unwilling (when they grasped the real meaning of the change proposed) to comply with greater protective conditions for the consumer, which have also a trading value. Viewing the position from this ground, we have Dr. Smith's pronouncement that "it was clear that all interests concerned would "best be served by giving to the gas undertakings the "utmost possible freedom in the selection of the cheapest "and most efficient methods of production." That is a very direct advantage; and yet Dr. Smith proclaims he is no enthusiast propounding the direct advantages of the therm basis. Notwithstanding—the Fuel Research Board having come to the conclusions which the lecturer faithfully quoted—he says "it was a natural step to recommend that gas should be sold on the heat unit basis." We cannot reconcile, one with another, some of the passages in the lecture. Here we need not refer to the changes that were made in matters of detail by the time the proposals of the Board reached the Statute Book. Suffice it to say that the principles enunciated in their report as to greater liberty for the industry and protection for the consumers, at the base of which stands the therm system of charging, are reproduced in the Gas Regulation Act.

What have been the effects so far, and what are the potential effects? We have seen that Dr. Smith praises, and up to a point approves of, what has been done; we have also seen that he is no enthusiast. Our American friends must be still looking for guidance to help them to frame an opinion on the subject. But as to the effects of the change. "I shall endeavour," said the lecturer, "in the remainder "of my address to put before you some of the effects of "the therm basis in England." The use of the word "some" is justified by the lecture. We would rather it had not appeared, and that Dr. Smith had set himself to show, as he sees them, the full potential effects of the Act. He limited himself largely to the point as to how the therm basis has been made the vehicle for bringing about adjustments between pre-war and present costs, standard and maximum prices, and actual charges to the consumers. He also showed that those gas companies who had their standard or maximum prices revised at the period of high costs have not taken any undue advantage of their fortuitous position by paying high dividends, through the possession of high standard prices while the charges to the consumers have been lowered so considerably. The power of revision vested in the Board of Trade will now be brought into operation as occasion demands. Then the lecturer pointed to the primary tendency to lower calorific values per cubic foot; and he mentioned the reflex movement in certain cases to a higher calorific declaration per cubic foot—mostly in the neighbourhood of 475 to 500 B.Th.U. In new conditions of this nature, one must work experimentally—circumstances being mutable—to a more or less settled state. It was acknowledged that "the value of the new basis lies in its flexibility, in that engineers may, as a result of their accumulating experience, send out the quality of gas which they can deliver to the consumer at the lowest cost per therm—not per thousand." He also pointed out how the therm basis does away with the need for any express limitation of inerts, for their uselessness has been intensified by the therm system. This is a direct advantage both to gas undertakings and to gas consumers. There was also recognition of the fortunate position conferred by the Act, in that, under the variable conditions of coal, plant, secondary products markets, and local use, it is left to gas undertakings to select their own calorific value for declaration.

Are there no further effects? Dr. Smith hints at one—the incentive the Act has been to investigation work in the attempt to devise new gas-producing systems which will show a higher economy and efficiency. This incentive is a very direct advantage to the industry. Since the Act came into force, the questions of manufacturing economy and efficiency, and the application of scientific control, have received from our technical men a degree of consideration never before matched in the whole history of the industry. We place this among the direct advantages. There has never before been so much effort demonstrated in bringing about a departure from old to new ways in which higher standards prevail; and a considerable part of this we put to the credit of the therm system. All this, however, is very obvious to the student of the tendencies past and present in the affairs of the gas industry. Another thing the therm system has done, which has both technical and commercial value, is that it has given to the gas industry and to gas consumers a universal basis of comparison. Formerly analyses of capital and working costs were worked out at per 1000 c.ft.—of what?—gas of 400, 450, 475, 500, or 550 B.Th.U. per cubic foot! The results showed a wide divergence. The make of low-grade gas often exhibited an advantage per 1000 c.ft. in capital, working costs, and charges to the consumer; now—the capital, working costs, and charges to the consumer (taking into consideration, where appropriate, the revenue from secondary products) having been brought on to the definite plane provided by the therm—we see relative values in a true light. The consumer, too, now knows that the therm is a definite quantity, and that what he pays per therm can be compared with the charges anywhere, providing the therm basis has been adopted. These are technical and commercial advantages of a direct order. Added to them is the fact that the therm is a highly valuable instrument in the competition with electricity. These latter are points that will appeal more directly to the responsible engineers and managers of gas undertakings, than perhaps to one whose life has been spent in the scientific work of the gas industry. Then again, the Gas Regulation Act has been an incentive in another important direction. Combined with the adoption of the therm system is the statutory obligation to adjust consumers' appliances on a change of declared calorific value. One of the most neglected parts of the gas industry, and yet the most vital, is found beyond the consumer's meter; and there the consumer has been in the habit of using gas in a most haphazard fashion. The obligation referred to is fast broadening outlook; and the neglect of the past will progressively be displaced by a policy that will have a permanent benefit upon the rate of expansion of the fortunes of the industry, and be genuinely defensive of its interest in competition.

These are all tendencies—largely attributable to the therm—which are highly valuable to the industry. The therm has been an inspiration, and will continue to be. It has an intrinsic value to which justice is not, in our opinion, fully done within the compass of the lecture before us. We agree with the portions of Dr. Smith's deliverance on the subjects of inerts and carbon monoxide. We do not place very much weight upon his doubt as to there being "half-a-dozen men in England other than Prof. Boys who could guarantee the accuracy of the readings [of the Boys recording calorimeter] over a period of thirty days," inasmuch as the instrument has not been under the practical control of men other than Prof. Boys and a few intimates. As to the regulations concerning gas examiners, the views of the lecturer may be tempered by reading in conjunction with them the information given in the "Memorandum" of the Gas Referees, as published in our issue for Oct. 3, together with an editorial article on the subject of the competence and impartiality of the examiners. From the present article, it will be appreciated by our American friends that we are somewhat more enthusiastic over the therm than is Dr. Smith, and that we hold that its adoption is warranted by several practical forces and considerations other than "the very special conditions and chaos that held in Britain at the termination of the war."

Gas-Main Alterations—The Iniquitous Chemical Restriction.

Slowly but surely we are getting larger and larger concentrations of gas manufacture, and more extensive distribution areas. Concentration in public utilities appears to be a general movement. Not only is it going on in gas supply, but in other fields of industry, such as transport, and electricity and water services. In gas supply, the latest big scheme is that of the Brentford Company. They have been extending their boundaries during the past few years, and have been incorporating in their own already substantial body several of the surrounding smaller undertakings. The plans now under the consideration of the Director of Gas Administration (Mr. H. C. Honey) transcend all the prior enlargement projects of the Company. They propose the

fusion with themselves of the Richmond and Harrow Companies, and neither of these is property that can be regarded as being on the small side. A new works scheme is also in contemplation. The inquiry into the Special Order in which these proposals are embodied occupied much time last week; and more would have been required had it not been for the intervention of Mr. Honey, who made a suggestion which had the happy result of removing the opposition of local authorities, who were there looking after the prospective positions in the matter of price of the consumers in their respective areas. There will probably be some amendments in the Order as finally issued; but there is now no likelihood of the main part of the scheme being in any way jeopardized or affected.

There are, however, two points which were introduced at the last sitting to which we wish to draw attention. We all agree that a considerable part of the Gas-Works Clauses Acts is now obsolete. Time and change have done their work in this respect; and so many of the enactments are totally unsuitable to current conditions. There are also numerous modern clauses which appear with monotonous regularity in new Private Bills and Special Orders—making them unnecessarily bulky—which should now be incorporated simply by reference to a General Act. This is legislative work that has been neglected. The National Gas Council and the authorities have from time to time turned their attention to the subject of revision. But admittedly it is a big job, and one that would require to be done with great care. This is among the reasons that the work is put off again and again to a more convenient season, which never arrives. Sir H. Courthope Munroe, K.C., who appeared on behalf of the Hertfordshire County Council in the Brentford case, and Mr. Aspinall, who represented certain Railway Companies, spoke of the antiquated character of the Gas-Works Clauses Acts; but they were both after an amendment of the works clause affecting the altering and relaying of gas-mains when road and bridge improvements were in hand. This is a matter that is swelling in importance for gas undertakings. On this occasion, among other things, it was contended that the cost of such alterations should fall upon the Gas Company, inasmuch as these were necessitated by the changing conditions of the times in respect of traffic, and the roads had to be widened and modernized for the general benefit of the community, while the gas-mains had been laid when things were wholly different. For the Company, Mr. W. E. Tyldesley Jones, K.C., strongly resisted the proposal; and, in our opinion, his argument is the correct one. The very reason advanced for making the Company liable for the cost of the main alterations and relayings—that the improvements were for the general benefit of the community—is sufficient for such work being regarded as incidental to, and in fact an integral part of, the improvement. As Mr. Tyldesley Jones pointed out, the Company are already heavy ratepayers, and so will have to contribute substantially to the cost of the road improvement work. The proposal of Sir Courthope Munroe and Mr. Aspinall, however, would impose upon the gas consumers a super-tax (so to speak) in relation to these improvements in comparison with the other ratepayers. This would be unfair; and therefore we hope that the cost of altering the positions of pipes—necessitated by road improvements, and not owing to changes in the business of the Company—will be regarded as part of the expenditure on the improvement and modernization scheme.

Another matter is the reappearance of the Alkali Manufacturers' Association—now in connection with Special Orders. They are asking the Director of Gas Administration to attach the one-third bye-product purchase restriction clause to the works clauses in such Orders. We hope the Director will do nothing of the kind. After the experiences of the war years, and in the interests of gas consumers, the time is again opportune for the gas industry to make a firm stand against this monstrous preferential protection of the chemical manufacturers—a protection which effectually limits co-operative action by gas undertakings to make the most profitable use of their secondary products. It is clear that restriction of purchase by one gas undertaking from others will increasingly tend to injure gas consumers through the inability of the undertakings to dispose of products in a manner which will impose upon them the lightest transport charges, and which will enable distillation and other plants in the possession of gas undertakings to be worked regularly and to the highest possible degree of efficiency. The internal economy of the gas industry—an industry serving the general community with a necessary—has a greater right to protection than the external claims of private chemical manufacturing firms. In this matter there should be free competition, and not statutory restriction. We know of no other non-statutory industry that has trade protection of similar character to that given to the chemical manufacturers. As a matter of fact, such protection and such restriction is altogether opposed to the findings of the Joint Committee of both Houses who specially considered the matter before Sir Harry Samuel's Committee refused, in one case, to be bound by those findings; and then the Private Bill authorities took the opportunity of framing a model clause on that decision rather than allow the purchase-freedom recommendation of the Committee who specially investigated the question to stand. There was always the feeling that personal influence had much to do with what the gas industry regards as an unfair proceeding, constituting a just grievance. Just as strenuously as the chemical manufacturers fight for the imposition of the restriction, just as strenuously should the gas industry resist it. We are glad to see this is the view of the Brentford Company. We wonder whether to-day the Alkali Manufacturers' Association would be prepared to accept the challenge of Mr. Tyldesley Jones to raise the matter on the floor of the House of Commons. Learned Counsel holds that "it is about time this protection, which very nearly caused irreparable injury to this country during the war, should be removed." We agree. In what he said, Mr. Tyldesley Jones did not go a step too far; and we hope the whole gas industry will endorse the stand he made. The gas industry is now opening up new history; the time is therefore particularly opportune for getting this illegitimate restriction abrogated. This will not be done unless the industry moves as a body in the matter.

Alloa!

THE editorial article in the "JOURNAL" for the 26th ult., entitled "An Alloa Scandal," seems to have caused a little ruffling of the feelings of some of the councillors of the burgh; and the matter has received the publicity of a discussion in the Council Chamber and the publication of a long letter addressed to us by Mr. W. M. Duncanson, the Interim Convener of the Corporation Gas and Electricity Departments, and the Town Clerk (Mr. James Cuthbert). Although the letter was addressed to us, on Oct. 12, the writers allowed it to be inserted in the "Alloa Journal" on Oct. 13 (probably, too, in other local papers) before it was possible for us to give it publication. This was an unusual proceeding, which, however, we freely forgive, as probably the writers were more concerned in propitiating the gas consumers who are fated to bear the accumulated losses of the electricity undertaking (however caused) than in attempting to counter the criticisms of a technical paper which has not a large circulation in Alloa, although, it appears, our article was given local publicity.

The letter referred to is published in our "Correspondence" columns to-day. Before dealing with it, let us say emphatically that our previous editorial article on this subject was not directed against any individual. It distinctly dealt with the policy of the Town Council (as a body) in allowing deficits to accumulate on the electricity undertaking, and then taking advantage of an Act passed thirty-three years ago, when the electricity industry was in its infancy, to place upon the gas consumers the burden of liquidating those losses. Decisions in such matters can only rest with the Council; and they cannot be made by any individual. On our part, there was no personal feeling whatever. As a matter of fact, we did not know the name of anyone connected officially with the Electricity Department, or that of any member of the Town Council. The drift there has been in accumulating the deficits, and the inequity of the course taken to liquidate them, are not matters for which any individual can be blamed. And now that for some six or seven years the gas consumers have to pay 7d. per 1000 c.ft. more than they would otherwise have had to do, the Council, through their apologists, still adopt a *non possumus* attitude. "There is the Act," they say in effect; "we have no other course than to discharge this annually "enlarged pile of deficits by making the gas consumers "pay." We have heard of "legalized immorality;" we will not so describe the Alloa situation, but we will call it "legalized inequity." If the Town Council could not make the electricity business pay through unfortunate local conditions in the shipbuilding industry, there were opportuni-

ties for asking Parliament for a revision of their ordinary maximum prices under the Statutory Undertakings (Temporary Increase of Charges) Act, which only expired this year. Many took that course; and Parliament, who can legislate one way, can legislate another, if a good and sufficient case is presented to it. So far as we can see, the Alloa Council did not attempt to gain statutory relief. And so they have fallen back upon the thirty-three year old Act in order to clear themselves through the gas consumers of the encumbrance which they have permitted to grow, and thus save the electricity consumers an increase of price beyond the maximum. Really it is fortunate for Mr. Duncanson and Mr. Cuthbert that the Act passed in the infantile days of the electricity supply industry still exists, as otherwise they would not have found any excuse whatever for what they must know (even if they try to conceal it) is an unfair proceeding in saddling the gas consumers with the losses incurred in supplying the consumers of electricity. That the idea of the 1890 Act was only to help electricity undertakings along in their young days, seems perfectly clear from the fact that no Act was ever passed with the view of making electricity undertakings responsible for any deficits incurred by gas undertakings. Why electricity undertakings should have had that preferential consideration, and why Scotland should have had it, and not England, Wales, and Ireland (such provision does not, so far as we know, exist in any other part of the world) is one of those mysteries which probably now will never be explained.

The question of unfairness is only one aspect of this matter. The question of legality is another. There is something very slipshod about the provision in the schedule to the 1890 Act when read in conjunction with the general powers as to the levying of gas rates in the Burghs Gas Supply Act, 1876. The schedule to the 1890 Act states: "The gas rates *leviable* and gas rents and other revenues receivable *under the General or Local Act.*" The question is how are the gas rates "leviable" to be determined. The Burghs Gas Supply Act, section 41, gives the information. It states:

> **The commissioners shall from time to time fix the price to be paid for gas to be supplied during any succeeding year or half year; and, until such price be altered by the commissioners, the price so fixed shall remain in force, provided that the price shall be such as will, as nearly as can be estimated, raise sufficient income to discharge all the costs and expenses of, and incident to, the manufacture and distribution of gas made, together with the interest on all money borrowed in respect of the works, and to provide the sinking fund required by this Act, and to provide for a depreciation and renewal fund sufficient to maintain the works in perpetuity and for all charges incident to the occupation of such works; and the moneys received in respect of, and incident to, the manufacture and distribution of gas shall be applied *to such purposes only*, and any balance at the termination of any year shall be carried to the debit or credit of the succeeding year.**

There is nothing in this section that authorizes the levying of gas rates for the making of surplus money for any other purposes than those mentioned; and therefore it appears to us that the rates "leviable" can only be for the purposes mentioned in the 1876 Act. We do not know of any other Act that has expressly repealed or amended this section, or given a new definition to the gas rates "leviable," as to make them extend to other purposes—not even to assist an electricity supply undertaking. This, however is a legal question, as is also the definition of the words in the 1890 schedule: "And other revenue receivable under the General "or Local Act." In view of these facts, there are authorities who are not inclined to concentrate upon the gas charges deficits arising from electricity undertakings in Scotland, and who hold that the local rates are as much liable—perhaps more so—to liquidate such deficits as the gas rates and rents. Have the Alloa Town Council taken Counsel's opinion on the point, having regard to section 41 of the 1876 Act? Anyway, we think there is sufficient ground here for resistance on the part of the gas consumers to the increase of the price of gas by 7d. per 1000 c.ft. for the purpose of paying-off the deficits occasioned by the supply of electricity consumers. We say this notwithstanding a recent statement (as reported in the "Alloa Journal") by the Convener of the Finance Committee of the Council: "We had no "power whatever to ask the ratepayers to pay by putting "anything on the rates for the reduction of any deficit on "the electricity account. Our only power in that connection lies in increasing the price of gas." Is the Convener quite sure on this point?

But now to the letter, which we are pleased to publish. The two gentlemen who sign it appear to have had some difficulty in drafting it. A reluctance is disclosed to deal adequately with what, we are confident, they recognize are the cardinal features of our criticism, and which are those dealing with debt accumulation, and the beautifully Gilbertian way of disposing of the debt by making the competitor pay. Looking at the structural details of the letter, in the first place it is correctly stated that a local authority should be prepared for fair and intelligent criticism; and we submit that those who criticize are also entitled to be dealt with "fairly and intelligently." The inference is that we did not deal fairly and intelligently with a condition of things which must be as unpleasant now for the Alloa Council to contemplate as it is for us whose responsibility and duty include the defence of gas interests when occasion requires. We seem to be accused of not being well-informed upon the essential facts as applying to Alloa; and we are told that we shall doubtless be sorry to learn that our facts and figures were neither full nor accurate. The facts and figures which we presented appeared to us to be full to overflowing; as to their accuracy—in respect of the essential figures—we still find no cause to regret them. If the figures presented the case in worse colours than they should have been, far from being sorry, we should be delighted, regarding the matter from the point of view of the gas consumers. Anyone who reads the letter of our correspondents in a "fair and intelligent" manner will note a strange absence of anything impugning the accuracy of the figures given as to the accumulated debt, and the result so far as the gas consumers are concerned. As they have not shown where the figures are wrong, let us ask Mr. Duncanson and Mr. Cuthbert these questions: Is it true that deficits on the electricity undertaking have been allowed to accumulate until they reach the robust sum of £32,446? Is it true that it is estimated that a further loss of about £3000 will be incurred this year? Is it true that, for every 1000 c.ft. of gas they use during the next six or seven years, the gas consumers will have to pay an additional 7d., until they have cleared off a sum amounting approximately to £40,000? Is it true that the electrical power consumers are to have a rebate of 15 p.ct., while the gas consumers are to pay an additional 7d. per 1000 c.ft. progressively to liquidate the electricity deficits? Perhaps the greatest hardship falls on gas consumers in outlying districts who already pay 8d. per 1000 c.ft. in excess of the Alloa price. These consumers are not ratepayers of the burgh, but are being taxed 7d. per 1000 c.ft. in order to provide lower charges for electricity to others, while they themselves cannot be provided with a supply of electricity for light and power. These gas consumers have no voice in the control of the affairs of the burgh in respect of gas and electricity supply. These are awkward questions and points our correspondents do not touch in the long letter which they have sent. We should therefore like answers to the questions, which will help to prove whether or not our strictures were justified regarding the policy of electricity deficit accumulation, and making the gas consumers pay when they had the right to expect gas still cheaper.

We will not dwell upon the somewhat laboured statement as to the conditions existing in the shipbuilding industry of Alloa, or upon the question as to the capital spent when there were expectations of still larger electricity demand. Those are causes that have produced certain effects; but we fail to find in them any sufficient vindication of the policy pursued. No member of the Alloa Council who is a business man would have adopted such a policy in connection with his private business, unless he wished to find himself in the bankruptcy court. Moreover, we cannot understand the depression of the industry of a town concentrating itself upon the electricity undertaking, and not affecting other trading concerns—the gas undertaking not excepted, with (as seen by the Board of Trade returns) its large patronage by prepayment consumers, who are largely industrial workers. It is seen from the published accounts of the Council that the ordinary rate for gas in Alloa four years ago was 2s. 5d., and for the past year 2s. 11d., with a net profit on the year's working of £4738, and this with a decreased output of 36 million c.ft. of gas since 1920. Also that the average price received from electricity consumers increased not far short of 200 p.ct. for 1923, compared with 1919, with a reduced output of 322,000 units; and notwithstanding this help, there was a loss of fully £3000.

There is only one other point with which we will deal. We are told that, so far as the Alloa Town Council are concerned, the gas and electricity undertakings are not now, and never have been, regarded as competing concerns. It matters little how the Town Council regard them; the fact remains that they are competing concerns—they compete for light, heat, and power. Moreover, separate accounts are kept of the two undertakings; and we think we are right in saying that since 1919 each department has had its own Engineer and Manager. This latter point we only make to show that the undertakings have separate entity. However the Town Council choose to regard them, no one outside that body would dream of looking upon them in any other light than as individual and competing concerns; and throughout the electrical world there would have been tremendous criticism had what has happened at Alloa occurred in connection with the gas undertaking, and involved the electricity consumers in a similar super-tax. The very fact that the gas consumers have to bear the burden of accumulated deficits, and not the gas and electricity consumers combined, is another indication of separate existence; and so is the fact that the provision under which the Council take refuge has not its counterpart in favour of the gas undertaking, and against the electricity consumers. We agree that to-day and the event prove how fortunate it was for the Alloa Council that their predecessors had the foresight to purchase the gas undertaking, which has provided a cheap gas service, and for some time to come would have provided a cheaper one still, to the tune of 7d. per 1000 c.ft., had it not been for the unfortunate financial straits of the Electricity Department.

Now a proposal is under consideration that the Scottish Central Power Company be asked to state on what terms they would be prepared to acquire the electricity undertaking. *Verbum satis sapienti.*

Road Reinstatement and Damage to Pipes.

THROUGH the action of the Aldershot Gas, Water, and District Lighting Company, two points were submitted to Mr. Justice Bailhache in the King's Bench Division last week which will have interest for the whole gas industry—in fact, for all users of the subsoil of the roads for the accommodation of pipes. The action was brought by the Urban District Council to recover the cost of work done; and there was a counter claim by the Company for an injunction to prevent the Council damaging their pipes. The report in our "Legal Intelligence" supplies the details of the matters at issue. To put them briefly: The Council claimed the cost of reinstating road surfaces after pipe work by the Company; there being an understanding between the parties that the Council should restore—the Company merely refilling the trenches. The counter claim revived the old question of the damage to pipes by heavy steam-rollers in the course of road work, which pipes were originally laid with adequate cover, and still showed a sufficiency with ordinary traffic.

The action by the Council raised a question of principle. There was no desire on the part of the Company to evade payment up to the point of their just indebtedness. The question was as to the standard of the reinstatement of the road surface; and this, it is obvious, is a point of cumulative importance. The contention of the Company was that the Council were only entitled to charge the cost of reinstating a road to the condition in which it previously existed; whereas the Council's idea was super-reconstruction—putting in a quantity of hard core, and covering the surface with tarmac. The Council claimed that they were only making the road as efficient as it was before. But the fact was that such surface reconstruction was in excess of the pre-existing conditions; and his Lordship expressed the view that the Council were not entitled to do this, which means that their title to charge for reinstatement could only be carried to the point of restoring the road surface to its former condition. There was an early intimation by his Lordship that he did not intend to decide the question of respective prices; and by agreement the matter was referred to the Official Referee to settle the amount due. The point is important, in view of modern ideas as to how the crusts of roads should be constructed. The Official Referee will naturally have regard to the expression of his Lordship's views as to the Company only being liable for the restoration of the road to its previous state.

The Company also succeeded on the counter claim. It was proved beyond doubt that the pipes in question never suffered breakage from ordinary traffic at the depth at which they were laid; and it was not until the 10-ton road roller passed over them that breakages occurred. There is no question that the exigencies of modern traffic demand a higher standard of road reconstruction than was formerly the case. But even the expert witness called by the Council could not deny that the pipes were broken by the steam-roller; and while he regarded this as absolutely essential in the construction of roads to-day, he admitted that he should, before doing the work, have taken steps to protect the pipes. The Council might alternatively have given notice under section 153 of the Public Health Act for the pipes to be lowered. His Lordship, in his decision, stated that he should grant an injunction against the Council from so repairing roads, using rollers such as to cause damage to the Company's pipes, without giving notice to have the level of the pipes lowered, or without supplying the pipes with adequate protection. But subsequently it was arranged that if the plaintiffs were prepared to give an undertaking to pay for damage done to existing pipes, such undertaking would be accepted in lieu of the injunction. Both of the points raised are highly important and interesting to all owners of pipes in the subsoil of roads.

Reductions of Wages.

There ought to be an honourable regard paid to agreements made nationally in respect of the reduction of gas-workers' wages. At Union headquarters there is as much aversion to departures being made from the agreements as there is on the part of the Federation of Gas Employers. Those who do not comply with them are helping to create difficulties which need not arise, but which are undermining the joint work of the headquarters leaders of the men and the representatives of the industry.

Novel Process for Dehydrating Tar.

Metals of low melting-point seem destined to play an important part in industrial heat processes, and will do so if the hopes of inventors in this direction mature. Among the purposes to which such metals are considered to be applicable is the distillation of tar. We have for some time past heard of plans being developed in this direction, and there have been visions of every gas works—even the small ones—being placed in the position of being able to treat their own tar *in situ* by a simple process. To the first step in this, attention is called through an article in this issue, by Mr. D. E. Garlick, Manager of the Glastonbury Corporation Gas-Works. Our contributor is quite enthusiastic over a plant for the continuous dehydration of tar which has been installed at his works by the Thermal Industrial and Chemical Research Company, Ltd., of No. 52, Grosvenor Gardens, S.W. 1. The average throughput of crude tar per twenty-four hours is about 11 tons; the tar having a water content of approximately 3·6 p.ct., and a light-oil content of about 3·2 p.ct. The article describes the process; and, among the details, mention is made of the fact that, instead of filling the still with tar, it is filled with a metal having a low melting-point—the tar flowing over the surface of this metal in a very thin layer. The dehydrated tar passes to a cooler; while the light oil and water vapours driven from the layer of tar travel from the top of the still to the condenser, and then to the separator—the light oils passing on to storage. Small space is required by the plant; control is simple; and one man can easily manage the work involved. The advantages of using a metal of low melting-point are described. We hope Mr. Garlick will on some future occasion let us have a further contribution supplying data as to the working results over a given period.

Unemployment and Tar.

The announcement that some fourteen millions sterling are to be spent on the making and repairing of roads is causing a considerable amount of interest among contractors for such work and for the supply of the materials used in modern road construction. The interest will extend to the producers of tar.

Coke and Briquettes.

The report for 1922 of the Chief Inspector of Mines, from which we recently quoted some particulars as to coal production,

contains data as to coke and briquette making. Excluding the amount used at gas-works, the quantity of gas coke sold in Great Britain in 1922 was 7,737,718 tons, as compared with 6,798,492 tons in 1921. The value at works is returned at £10,790,947 and £14,369,952 in the two years respectively. Coke-oven plants carbonized 13,290,580 tons of coal, as against 6,883,112 tons in 1921. The coke produced in the two periods amounted to 9,035,741 tons and 4,573,970 tons. The total number of coke-ovens in action during 1922 was 10,897—2687 beehive, 7734 bye product, and 476 other kinds. With regard to briquettes, the total production in 1922 was 1,332,232 tons; the value being returned as £1,659,082. These figures compare with 1,064,204 tons in 1921, with a value of £2,134,737. A short time ago the briquette producers were grumbling over the price of pitch, and were seeking to get the material diverted from road to briquette making. The object of this, it was believed, was to force down the price. Nevertheless, it will be seen by the foregoing figures that the output increased by upwards of 25 p.ct. The briquette makers do not seem to be short of business.

Iron and Steel.

It is a long time since the iron and steel trades enjoyed such a flow of orders as they have been receiving since the policy of the Government for the relief of unemployment had so much publicity. Sir Montague Barlow has been telling the country of what railway companies, local authorities, and public utility undertakings are going to do, and the millions they are preparing to spend. It is thought that this accounts for the fresh life that is found in the demands on the iron and steel industries. Is some of the buying being made with the view of getting well forward with the work? Is some of it of a speculative character? Or are there fears that a rush of orders will later send-up prices abnormally? Some people are looking over at the Ruhr Valley, where, so it is reported, there are 1½ million tons of steel waiting to be dumped somewhere. But the British Government are only going to assist schemes, for which all the material is produced in this country.

Coal Exports.

The exports of coal were not so good in September as they were in the corresponding month last year. The total was 6,316,396 tons, as compared with 7,082,729 tons last year. The respective values were £7,824,126 and £8,110,083. The shipments of gas coal showed a considerable reduction—the month's quantity being 738,249 tons, compared with 1,267,824 tons in September, 1922. The aggregate value last month was £885,036 (an average of £1 3s. 11·7d. per ton), as against £1,405,596 in September last year. Up to the end of September, the total shipments of coal of all kinds were 59,472,942 tons, which contrasts with 45,476,573 tons for the corresponding nine months of 1922. The respective values were £75,395,567 and £51,410,935. In the nine months, the gas coal shipments totalled to 6,950,160 tons, compared with 6,725,032 tons—the ascribed values being respectively £8,453,494 and £7,389,032.

Gas Coke Shipments.

The quantity of gas coke exported in September was 140,339 tons, of a value of £241,870, or an average of £1 14s. 5·6d. per ton. In September, 1922, the quantity shipped was 111,546 tons, of a value of £152,711. In the past nine months, 834,395 tons of coke have been shipped; the value being £1,319,035. The export of gas coke in the same period of 1922 was 585,758 tons (value £840,875); and in the corresponding period of 1921, 270,945 tons (value £644 363). The business in British gas coke abroad is growing well.

Sulphate of Ammonia Exports.

Last month, 23,858 tons of sulphate of ammonia were shipped, compared with 14,873 tons in September, 1922. In the nine months of this year, the quantity sent abroad reached the substantial figure of 185,006 tons, compared with 103 621 tons in the corresponding period of 1922.

America's Export Oil Trade.

During the fiscal year ended June last, America exported oil to the amount of 3,374,003,942 gallons, compared with 2,800,355,569 gallons in the preceding twelve months. This is a new record Looking down the items of refined products, it is seen that during the fiscal year gas and fuel oils were exported to the amount of 937,243,885 gallons, as against 740,196,772 gallons in 1921-2. Illuminating oils accounted for 854,556,805 gallons, as compared with 807,701,003 gallons. Gasoline and other light products climbed up to 672,758,992 gallons, as compared with 550,550,327 gallons in the previous year. The increase of 122,000,000 gallons in motor spirit is notable.

PERSONAL.

MR. GEORGE CLARRY TO RETIRE.

After nearly forty years of active service with the Cardiff Gas Company, Mr. George Clarry, the General Manager and Secretary, has decided to retire and reside at Bournemouth.

During Mr. Clarry's long connection with the Company, the growth of Cardiff has been remarkable, and the gas consumption has kept pace with the town's development. The undertaking generally is admittedly among the most up-to-date in the country, which is gratifying knowledge for Mr. Clarry to take with him into retirement. Mr. Clarry has always been a hard worker; but he fully realized the truth that work is not everything, and long will be remembered the warm interest taken by the Directors and himself in the welfare of the employees—especially in the matter of sport. The Company have at present a flourishing athletic club, numbering 700 members, with branches and sections to suit old and young; and Mr. Clarry has been very proud to be associated with them as their President. There is a first-class Rugby football team, as well as cricket and tennis sections; and in the winter months there are social functions, including a fortnightly whist drive. The inception of this useful organization was due to the Directors, who generously provided an excellent recreation ground, with pavilion.

Mr. Clarry's activities in public work are well known, and as a co-opted member of the Education Committee his keenness and broad business capacity are greatly appreciated—particularly in connection with the Cardiff Technical College, of which he is Vice-Chairman. He is President of the local branch of Chartered Secretaries, a Past-President of the Chamber of Trade, and is actively associated with many other Institutions in the city. An enthusiastic Freemason, he is a Past-Master of the old Glamorgan No. 36, and an Officer of Grand Lodge.

In the larger field of gas organizations, Mr. Clarry is also well known and respected. He is one of the oldest members of the Gas Companies' Protection Association, and a member of the Executives of the National Gas Council and of the British Commercial Gas Association.

His many friends, including the Board of Directors of the Cardiff Gas Company, wish him many years of health and comfort in his retirement.

Mr. Bernard F. Browne, M.Inst.C.E., M.Inst.E.E., the Engineer and Manager of the gas, water, tramways, and electricity undertakings of the City of Santos Improvements Company, Brazil, has been elected a local Director of the Primitiva Gas Company of Buenos Aires.

Mr. P. Baxter, Managing Director of the Barrowfield Iron-Works, Ltd., Glasgow, is leaving, after over 25 years' service, to take up the post of Commercial Manager to Messrs. James Dunlop & Co., Ltd., of Glasgow. This appointment is a decided promotion in Mr. Baxter's career; and he leaves the Barrowfield Iron-Works with the best wishes of the gas profession and his colleagues.

Mr. E. Percy Stevenson, late of Milan, is leaving the service of the Rio de Janeiro Tramway Light and Power Company to go to Buenos Aires as Chief Engineer of the Primitiva Gas Company. Mr. Stevenson was in the service of the former River Plate Gas Company of Buenos Aires, before going to Milan in 1910. He has for the past two-and-a-half years been acting as Consulting Engineer to the gas undertakings of the Brazilian Traction Company in Rio de Janeiro and San Paulo.

Mr. James W. Gardner, who for the past 25 years has been Chairman of the Rugeley Gas Company, was recently the recipient of a life-size portrait of himself, oak framed, and suitably inscribed, in addition to a smaller portrait of Mrs. Gardner, which was also inscribed. A portrait of Mr. Gardner was also given to be hung in the Board Room at the gas offices. Mr. F. Wood, who presided, said that for more than a quarter-of-a-century Mr. Gardner had given the Company of his best. Mr. Gardner thanked the subscribers for the gift.

At a meeting of the County Borough of Stoke-on-Trent Gas Committee on the 5th inst., Mr. Edward Crowther, M.Eng., A.M.Inst.C.E., of Wallasey, was appointed to the position of Assistant Gas Engineer. Mr. Crowther was educated at Wallasey Grammar School and Liverpool University, and has held the positions of Technical Assistant to the Aldershot Gas, Water, and District Lighting Company and Chief Assistant to the Wallasey

Corporation Gas and Water Department. While Mr. Crowther has been at Wallasey, extensive additions have been made to the gas-works, including the installation of high-pressure plant and mains, &c. Mr. Crowther commences his new duties early in November.

In recognition of his forty years' service as Manager, and later Secretary also, of the Wigston (Leicestershire) Gas-Works, Mr. JOHN ALFRED HARRIS was last week presented with a gold watch and chain by the Directors of the Company. Mr. J. C. A. Richards, who presided, in making the presentation, said it was hoped that Mr. Harris would be their Manager for many more years. Mr. Harris, he pointed out, commenced his duties as Manager on May 11, 1883, when the number of consumers was about 150 and the annual production of gas some 3 million c.ft. To-day the consumers numbered 2100, and the annual production was 56 million c.ft. The storage capacity in 1883 was 26,000 c.ft., and now it was 250,000 c.ft. The works to-day were capable of producing from 65 to 70 million c.ft. South Wigston had been entirely built since 1883. Practically all the mains had been replaced by new and larger ones; the trunk main to South Wigston being 15 in. in diameter. Mr. Harris, in thanking the Directors for their gift, said the motive which prompted it was more to him than the monetary value. This occasion brought to his mind a long succession of Chairmen and Directors associated with his management, and whose memory to him was very precious. One thing that had helped him more than anything else to build-up the undertaking to its present efficient state was the mutual good feeling and confidence which had always existed between himself and the Directors.

OBITUARY.

Mr. W. TALLENTIRE, Manager of the Lurgan Gas-Works, has received news of the death of his son, Mr. Miles Tallentire, a pilot in the R.A.F., as the result of a flying accident in India. Our sympathy is extended to him.

CHEMICAL TOPICS FROM CURRENT LITERATURE.

Notes from Recent Technical Publications.

By H. J. HAILSTONE (Rochdale).

STEAM RAISING.

A much neglected point regarding fuel economy is brought into prominence by Mr. Brownlie in an engineering contribution to the "Manchester Guardian." Often, in conducting evaporation tests and estimating efficiencies, no attempt is made to complete the job by determining the amounts of steam consumed by the auxiliary apparatus—such as feed pumps, mechanical stokers, forced-draught production, &c. As these items may easily account for as much as 10 to 20 p.ct. of the total steam raised, the matter is of great importance; and according to Mr. Brownlie, a study of records from steam meters fitted to show the amount of steam actually used on the boiler plant "would give most steam users a shock of considerable magnitude."

TEMPERATURE CONTROL.

The use of certain liquid dyes is described by P. A. Kober in "Industrial and Engineering Chemistry," in connection with temperature control. Many dyes of the triphenyl-methane series readily break down when heated; and thus a colour change or disappearance occurs at definite temperatures. A number of suitable dye materials are listed for indicating visibly the excessive heating of any body. This recalls a similar idea brought before the Birmingham section of the Society of Chemical Industry some years ago by Mr. Pinnock, of the South Staffordshire Mond Gas Company. A precipitate of copper-mercury iodide, a red powder, was made up into a paint or enamel suitable for application to metal surfaces. The compound forms a black allotropic modification at a definite temperature when heated, and so can be used as a temperature indicator. Like many other inorganic compounds of this nature, it possesses the property of resuming its original colour on cooling. The paint was applied to the outside of a large engine bearing. So long as there was no overheating the red colour was apparent; and any change in colour served as a danger signal to the attendant. The idea has many useful applications in the gas industry.

SULPHATE-PLANT EFFLUENTS.

Owing to discolouration of river water, caused by the effluent from one of the Australian Gas Company's sulphate plants working-up the ammonia liquor from vertical retorts, an investigation was undertaken to discover the cause. The first part of this work is described by G. S. Currey in the Transactions of the Society of Chemical Industry. It was found that the vertical-retort liquor contained up to 0·1 p.ct. of phenols, which, on exposure to the air, gave a dark red colouration in alkali solution. After isolation of a quantity of the crude tar acids from the liquor, the presence of polyhydric phenols, including catechol, was proved. These compounds are soluble in alkali, and form dark solutions on oxidation by air. This subject will be dealt with in an early number of the "JOURNAL."

BENZOLE RECOVERY.

As the use of solid absorbents in benzole-recovery practice has not been employed in this country, the excellent article by R. Furness in "Chemistry and Industry" should not be overlooked. After a summary of the principles upon which successful absorption by oil depends, the behaviour of charcoal and of silica gel is considered, and some useful information given. When it is pointed out that a good solid absorbent will take up about 20 p.ct. of its own weight of benzole, as against the 3 to 4 p.ct. taken up by oil, it is seen that there are possibilities worth considering about such a process. From the figures given, the necessary plant required would be smaller and cheaper than that required for oil washing to the same extent. It is stated that silica gel does not deteriorate in use (absorption of benzole, and subsequent steaming) provided there is no danger of contamination with tar fog, &c. Large-scale experiments already appear to have been conducted at the Cologne Gas-Works. Doubtless some of our coke-oven staffs have also experimented along the same lines.

OXIDATION OF NAPHTHALENE.

The "Journal of the Chemical Society" reports from a Japanese source a study of the conditions of the oxidation of naphthalene by air in the presence of catalysts such as vanadium and molybdenum oxides, together with other oxides. From a knowledge of the temperatures of the different parts of the bed of catalyst, an idea of the nature of the reaction can be obtained, and the yields controlled. A temperature of about 300° C. appears to be the best for the formation of phthalic anhydride; and such factors as the ratio of air to naphthalene, the velocity of the gases, and the time of contact have a bearing upon the yields obtained. This method is a great advance on the old sulphuric acid and mercury process; and according to Prof. G. T. Morgan (Chemistry and Industry) such a process has been for some considerable time in operation on a big scale at the Grangemouth works of Messrs. Scottish Dyes, Limited. The plant is controlled entirely by electrical means, and yields a chemically-pure product.

EXTRACTION OF PHENOLS.

Our growing knowledge of the chemical and physical behaviour of compounds and mixtures at high pressures has recently been further extended by F. Fischer (Brennstoff-Chemie). A study has been made of the extraction of phenols from tar oils by means of water at a temperature of 200° to 300° C., and at a correspondingly high pressure. It was found possible to wash or dissolve out a large proportion of the phenols present by this means, though care had to be taken to avoid excessive temperatures, as otherwise small amounts of the hydrocarbon oils were also brought into solution. The aqueous solutions, after removal from the autoclaves in which the extractions were performed, were cooled, in order to separate the phenols. The aqueous portion could then be used again for a repeated process. By this method, low-boiling phenols were extracted by the superheated water, and the higher phenols retained by the oil.

CORROSION TESTING.

In examining metals and new alloys, with a view to their use under special conditions, it is advisable to submit samples to a trial under the actual working conditions; and in this connection W. S. Calcott, writing in "Industrial and Engineering Chemistry," gives instructions which should be observed when making comparative laboratory tests for determining the likely degree of corrosion of materials under plant conditions. To obtain accurate information it is necessary to maintain the correct temperature and to use comparatively large volumes of solution, in order to avoid any great change of strength and composition that otherwise may occur. Tests should be of prolonged duration, so that the ultimate rate of corrosion is obtained, and not the rate at which this proceeds at the commencement—usually a much higher figure during the early stages of contact. For comparing results, the writer recommends a standard of thickness as preferable to one of weight.

Southern Association of Gas Engineers and Managers (Eastern District).—The next meeting of the Eastern District of the Association will be held on Nov. 20, at 2.30, at the Institution of Gas Engineers, No. 28, Grosvenor Gardens, S.W.

London and Southern District Junior Gas Association.—The opening meeting of the new session and re-union of members will take place at the Westminster Technical Institute, S.W., next Friday evening, at 7.30, when Mr. Walter Grogono, of the Gas Light and Coke Company, will deliver his Presidential Address.

City and Guilds of London Examination.—A list of the successful candidates in the City and Guilds of London final examinations in gas engineering, supply, and fitting was published in the "JOURNAL" for Aug. 8 (p. 473). We learn from Mr. T. P. Ridley, Secretary and Commercial Manager of the Newcastle-upon-Tyne and Gateshead Gas Company, that the following candidates, all of whom are in the employ of this Company, were among those successful in Grade I. of the gas supply examination: 1st class, Messrs. J. R. Heffel (1st Prize, Bronze Medal), J. V. Cooper, W. Henderson, W. N. Hogg, A. T. Heron, T. J. Laycock, J. M. A. Mitchell. 2nd class—S. Burrows, E. R. Johnson, B. Mitchell.

XUM

ELECTRICITY SUPPLY MEMORANDA.

The electricity industry is beginning to feel a large amount of security over a striking display at Wembley next year. The "Electrical Review" has had an editorial note on the subject.

Wembley Progress.

According to this, the electrical demonstration will in effect be in two parts. There will be the plant makers' show; and there will be that of the Electrical Development Association, in the shape of demonstrations of domestic and industrial applications. Space-letting in the Electrical and Allied Section has reached 94 p.ct. of the area allotted to the "B.E.A.M.A." Firms who have not taken space are exhorted to hurry-up, so as to obtain a part of the remaining 6 p.ct. One difficulty that would-be exhibitors anticipated was as to the provision of attendance for a six months' run of the exhibition. But this has been overcome by arrangements made for the "B.E.A.M.A." staff to take care of exhibits, and undertaking to forward letters or inquiries received at the exhibit. It is also stated that there is the promise of success for the popular demonstration, by the Electrical Development Association, in the Palace of Electricity. A reference to funds, however, is a little guarded. The reader is informed that the "funds forthcoming from many electricity supply authorities amount in the aggregate to a very substantial figure." But this is not sufficient. Our contemporary addresses itself in a reproving fashion to the electricity supply companies in the Metropolitan area. They are said to be backward in rendering substantial financial support. This is apparently considered to be not very creditable, seeing that they "stand to gain more than anybody else from so fine a piece of electrical propaganda work." Our contemporary fails to understand this attitude, seeing that the companies have been doing well, paying high dividends, and have good market values for their shares. They have also, if the London County Council scheme goes through, the prospect of an extension of tenure for forty years. Yet the companies have failed to respond generously to the invitation to subscribe funds to Wembley. This indifference appears almost to choke our contemporary. Perhaps the reasons it gives as to why the companies should subscribe are the very ones why they think they need not do so. They are doing well. But if this is their reason, we are on the side of our contemporary. There is on our part a strong belief in the value of industrial co-operation. We also read that something else is required in the electrical industry—something in addition to this display. It is that there must be, according to the "Review," more reasonable charges to consumers to help to a big forward movement, and a greater all-round prosperity for the electricity industry.

An Electric Heating Association.

Apparently some electrical men consider that more stimulation is required in connection with the applications of electricity to domestic purposes. Mr. J. H. Bowden is one of them. A large amount of propaganda work has been done in connection with domestic electric heating; but there is still the feeling of slow progress. Now Mr. Bowden suggests the formation of an Electric Heating Association; but other electrical engineers wish to be defended from an extension—even by one—of the organizations of which they are expected to be members, and the meetings of which they have to attend. Mr. A. C. Cramb, the Hon. Secretary of the Incorporated Municipal Electrical Association, does not know of any reason for another Association—particularly seeing that, as a result of a suggestion made at the 1922 convention, the Municipal Electrical Association appointed a Committee (on which companies are also represented) to deal with the problems of electrical cooking. In addition, area Sub-Committees have been formed throughout the country. This Committee have been doing hard work for twelve months, under the chairmanship of Mr. R. B. Mitchell, of Glasgow; and Mr. Cramb claims that it is largely due to the operations of this Committee, combined with the efforts of the Electrical Development Association, that the demand for cookers has gone up so enormously during this period. Most electrical engineers and manufacturers will be inclined to disagree with the term "enormously." The question of producing a standard cooker is under the consideration of the Committee. They have evidently taken a leaf out of the book of the National Gas Council.

Misusing Electricity.

The stealing of electricity, or misusing it in some way, appears to be on the increase. We have noticed instances of this more frequently lately. Reports of other cases come from Blackpool. A man, named Hodge, has been fined there for taking current through a power meter for lighting. Up to June last, his workshop had two meters—one for lighting, and one for power. He gave instructions for the lighting meter to be disconnected—leaving only the one for power. Then he went to reside over his workshop; and the power consumption ascended sufficiently to attract the attention of the authorities. A little investigation quickly showed that five lamps had been connected to the power circuit for lighting purposes, thereby consuming a considerable amount of electricity at power rate. The misdemeanant is not likely to repeat the offence, inasmuch as for this side-stepping from the path of virtue he has had to pay £5. Another man named Hart on the same occasion was fined 20s. for connecting-up a meter without notice. When the former tenant left the house, the fuse from the electricity box was removed, and the box was sealed-up. Defendant made formal application for a supply on Aug. 11. On Aug. 16, an employee of the department found the seal of the box broken, and the fuse replaced. There was an emphatic denial of all knowledge as to what had been done; but the fact was that the seal could not have been broken and a fuse inserted without human action. The person responsible has had to pay.

The Commissioners' Annual Report.

The complete report of the Electricity Commissioners for the year ending March 31 has been issued. This is prompt work, considering the very large province over which they have jurisdiction. In the early part of the report, remark is made upon the general improvement in the electricity supply industry as being one of the features of the period under review. This is attributed to improving trade, lower prices of coal and plant, and the reduced cost of labour. These factors have caused a reduction in the price of electricity; and this has created such an additional demand that, according to the Commissioners, the large majority of supply undertakings show satisfactory financial results. There is, however, much leeway to be made up before home trade generally, and the electricity supply industry in particular, can be regarded as operating on a normal basis. On March 31, 324 local authorities, 212 companies, and eight persons were authorized undertakers in Great Britain—an increase of nine authorities and one person, compared with the previous year. It is learned that a list of non-statutory concerns is being prepared with the assistance of the Post Office Engineering Department. It would be a good thing for the gas industry if official channels would provide a full list of non-statutory gas undertakings. Penetrating into the report, it is seen that, during the year, no further electricity districts were provisionally determined. But the passing of the 1922 Act enabled the Commissioners to proceed with the schemes for the London and Home Counties District, and the Mersey and West Lancashire District. Four draft Orders were published embodying approved schemes for the purpose of further local inquiries. These were North Wales and Chester, London and Home Counties, South-West Midlands, and South-East Lancashire. Inquiries were duly held, and Orders have been confirmed subsequently in each case, except that of London, which, through well-known causes, had to be deferred. Two other draft Orders have been published since March 31 (Mersey and East Midlands); and three are in course of preparation—West Riding, North-West Midlands, and Edinburgh. Eight local inquiries were held—four first, and four second. With regard to the West Riding (Aire and Calder) Electricity District, the Commissioners remark that the efforts of the principal parties and of themselves to arrive at an equitable settlement have involved very protracted negotiations, which have not only delayed completion of the approved scheme, but also have embarrassed the Commissioners in dealing with other matters, some of an urgent character, relating to different portions of the district. The fifteen electricity districts which have been provisionally or definitely delimited include the most important industrial areas in Great Britain, with the exception of the North-East Coast area. The Commissioners indicate that the local inquiries which have been held in respect of thirteen of them have established the definite advantages to be derived from the re-organization of electricity supply, as well as the difficulties to be overcome. For twelve districts, responsible for more than 50 p.ct. of the whole of the public supplies of electricity in Great Britain, the maximum demand in 1921 was 1,146,860 kw. It is expected to reach 2,040,675 kw. in 1926, and 2,937,090 kw. in 1931. The total output during the year was 2632 million kw.; it is expected to be 4990 millions in 1926, and 7356 millions in 1931. The Commissioners regard these figures as reasonable and even conservative, pointing out that in some cases during the past year the growth in output was approximately that previously estimated for the first quinquennial period.

Private Generating Plant.

An interesting feature of the report is that the Commissioners have been impressed with the extent to which private generating plant has been installed by manufacturers and trading associations. In one district, the private plant installed by collieries and other industrial undertakings largely exceeded the total capacity of the plant installed by the whole of the authorized undertakers. It is remarked that the small size and relatively high running costs of many of the public supply stations have hitherto had an adverse effect upon the application in industry of electrical energy for power purposes; and manufacturers have often found it more advantageous to instal their own generating plant than to take a supply from a public source. The Commissioners think, however, that reduced cost and increased reliability resulting from the centralization of generation in electricity districts will serve to accentuate the tendency to have recourse to public supplies, and also lead to the gradual discarding of much of the private generating plant at present in operation. Bearing upon this point, the Commissioners have seen in the evidence regarding the reorganization of electricity supply that large economies will result from it; but they add it would be premature at the present stage to attempt to forecast the extent

of the economies which will be realized in actual practice when approved schemes have been brought into operation.

Sanctions and Consents.

The aggregate plant capacity of the new stations and extensions of existing stations sanctioned by the Commissioners during the year amounted approximately to 422,000 KW., as compared with about 169,000 KW. for the preceding year. The figures, however, cannot be regarded as affording more than an approximate measure of the relative rates of development, as the former figure includes a number of consents in respect of important applications which were under consideration during the previous year. The consents under section 11 of the Act of 1919, issued by the Commissioners since their establishment, represents a gross addition of 1,279,088 KW. to the plant capacity of authorized undertakers, railway and tramway authorities, and non-statutory undertakings; about 90 p.ct. of the sanctioned plant being for use in England. The net addition, however, is somewhat less than the figure quoted, owing to the replacement, in a number of cases, of inefficient or obsolete plant by the new plant which has been sanctioned. Of the total generating plant sanctioned, about 29 p.ct. was for new generating stations, and 71 p.ct. for extensions of existing stations. The division of the total as between the various authorities was as follows: Local authority undertakers, 65 p.ct.; company undertakers, 29·4 p.ct.; and railway and tramway authorities and non-statutory undertakings, 5 5 p.ct. The total plant capacity of the extensions sanctioned throughout the country in respect of authorized undertakings during the period in question was 850,845 KW.; the extensions of the principal generating stations in nine electricity districts accounting for 582,750 KW., or 68·5 p.ct. of the total. These figures afford an indication of the extent to which it has been possible for the Commissioners, during the transition period, to control development along lines which will accord with the engineering schemes for different districts.

Commissioners' Expenses and Units Generated and Sold.

Among other interesting points in the report are the figures relating to the finance of the Commissioners. As to the cost of administration, the estimate for the year exceeded by £44,000 the estimated receipts; and the liability to the Exchequer in respect of the first annual instalment in repayment of the advances made amounted to £35,000. The total amount to be apportioned among the electricity undertakings was, therefore, £79,000. The actual net expenditure on administration in 1922·23 was £35,566—a saving of £8434 on the estimate. A further saving of £646 was effected owing to the acceleration in making repayment of the instalment due to the Exchequer. From these savings £4566 was applied to the further reduction of the outstanding balance of advances. The outstanding liability of the Commissioners in respect of advances and the accrued interest amounted on March 31 to £56,000. During 1922·23, 3,888,234,000 KW. were generated in Great Britain; and the apportionments in respect of the £79,000 approved by the Ministry of Transport were made on authorized undertakers in June, 1922, towards the expenses of the Commissioners for 1922·23—thus involving a payment by each authorized undertaker of 4·9d. per 1000 KW. generated. The basis of apportionment was altered by section 7 of the Electricity (Supply) Act, 1922, from units generated to units sold—the latter being defined as meaning "all units generated or purchased by a Joint Electricity Authority or authorized undertaker, less those used in the generating station, those lost in transmission or distribution, and those sold in bulk to authorized undertakers." The certified returns showed that the electricity sold during the year ending Dec. 31, 1922, was 3,645,190,732 KW.

A Collection of Useful Information.

From the Robbins Publishing Company, Inc., of New York, publishers of the "Gas Age-Record," we have received a copy of "Brown's Directory of American Gas Companies and Gas Engineering and Appliance Catalogue." The title is imposing, and the contents of this remarkably well-prepared volume are not less so. Publications of this nature are of great use to the works manager and, indeed, to all those who help to direct the policy of gas undertakings. The basic purpose of the volume is to bring together the gas statistics of the manufactured and natural gas companies, parent companies, public service commissions, members of associations, &c., and to add to these statistics in condensed form the catalogues of the principal manufacturers of gas equipment, appliances, and supplies. This has been done; and all the information has been standardized in form and style, comprehensively indexed and cross-indexed, and the whole brought within the covers of one large volume. Every gas manager who contemplates the purchase of gas-apparatus knows the difficulties which, as a rule, attend the use of manufacturers' catalogues. There is no uniformity in the arrangement of the material, and often the facts most vital to the buyer are omitted entirely or are supplied in separate sheets. To have this material arranged systematically and collected in one book of reference offers obvious advantages. The illustrations throughout are of a high order; and among the many excellent features of the publication attention may be drawn to the alphabetical list of technical books relating to the gas industry, for each of which an epitome of the contents is given.

AMSTERDAM INTERNATIONAL GAS EXHIBITION.

Jubilee of the Dutch Association of Gas Engineers.

Towards the end of last year it was announced by Dr. L. G. Terneden (the Manager of the Amsterdam Municipal Gas-Works) that it was the intention of the authorities of the city to organize an international gas exhibition—they being encouraged to take this step by the excellent results which had accrued from a similar exhibition held in the city in 1912. There were also reasons which made this year a particularly suitable one for a repetition of the former success. In 1898 the works in the city belonging to the Imperial Continental Gas Association became the property of the Amsterdam Municipality; and, singularly enough, the twenty-fifth anniversary of this event in 1923 coincided with the jubilee of the Dutch Association of Gas Engineers.

The time arranged for the holding of the exhibition was from Oct. 13 to Nov. 11; and under the guidance of the following influential Committee, plans were drawn-up upon the outcome of which the members are to be congratulated: Heer W. De Vlugt, Burgomaster of Amsterdam; Heer F. M. Wibaut; Dr. L. G. Terneden, Director of the Municipal Gas-Works of Amsterdam (Chairman); Heer G. A. van Everdingen, Assistant-Director of the Municipal Gas-Works of Amsterdam; Heer O. S. Knottnerus, President of the Association of Dutch Gas Engineers; Heer J. Leonard Lang; Heer Ir. W. Niermeyer, Vice-President of the Association of Dutch Gas Engineers; Heer P. W. Scheltema Beduin; and Heer J. Diephuis Wzn., Chief Engineer, Municipal Gas-Works of Amsterdam (Secretary-Treasurer).

Not only is the exhibition an international one, but the jubilee meeting last week of the Dutch Association of Gas Engineers, in connection with which it was held, was of an international character also, in the sense that there were attending it visitors from England, France, Germany, Italy, Switzerland, and Belgium. From this country, there were present Mr. Samuel Tagg, of Preston (President of the Institution of Gas Engineers), Mr. Walter T. Dunn (Secretary), and Mr. F. W. Goodenough (Chairman of the British Commercial Gas Association). It was the second official visit of Mr. Goodenough and Mr. Dunn to the city, for they were both there in 1912, when the former represented the late Sir Corbet Woodall at a special function in connection with the opening of new works there. It is of interest to recall that Heer Knottnerus (Chairman of the Dutch-India Gas Company), who is President of the Dutch Association in this their jubilee year, was also President in 1912. Many readers of the "JOURNAL" enjoy, of course, the pleasure of personal acquaintance with Heer Knottnerus, for he, with Dr. Terneden and Heer L. P. J. M. Sauter, of Rotterdam, was present at the recent British Commercial Gas Association conference and National Gas Exhibition in Birmingham.

The reception accorded in Amsterdam to the representatives from this country was of an extremely cordial nature—this being a repetition of previous experience in the same connection. After a visit to the exhibition on the morning of Monday, Oct. 15, they attended the first function, which took the form of a luncheon given by Heer Knottnerus to the Committee and Jury of the Exhibition and the visitors. On the same evening the Dutch Association of Gas Engineers held a reception, which was followed next morning by the opening of the business meeting of the Association with an address by the President, in the course of which he extended a hearty welcome to all the visitors—referring in a passage in English to those from this country.

On the Tuesday afternoon, there was a reception in the Town Hall by the Deputy Burgomaster of Amsterdam; and this was followed the same night by the principal function of the meeting, when a festival dinner was given by the Institution in celebration of their jubilee. Wednesday afternoon there was an excursion, and another dinner in the evening; and on Thursday an official visit to the exhibition took place.

The exhibition is being held in a building used for motor shows, in the outskirts of the city. The one hundred and more stands are well laid out. Indeed, the main impression that one receives on entering the exhibition is one of spaciousness and airiness—largely due to two facts. The first of these is that the gangways are very wide; and the second that, with the exception of those placed in bays around the building, there are roofs to none of the stands. They are simply stands with apparatus on them, and they are not closed-in in any way. An excellent historical section contains many interesting documents and pieces of apparatus illustrating the development of lighting, cooking, and heating; and there are also numerous very good exhibits of cooking apparatus for use in the home, as well as in hotels, restaurants, and institutions. Demonstrations are given of cooking and bread baking. There are a number of displays of geysers, but not of other types of hot-water apparatus. Industrial appliances, again, are not very extensively represented. Among the principal exhibits of interest in this connection are two boilers—one for supplying hot water and the other for raising steam—shown by the Spencer-Bonecourt Company. A certain number of heating appliances are on view; and there are, of course, stands which display lighting fittings of all descriptions.

It will be agreed that those responsible for the arrangement of the exhibition have done their work well. Uniformity in the scheme of decoration and in the titles over the stands gives a pleasing effect, and a suggestion of unity, to the display viewed as a whole.

XUM

EXPERIENCES WITH THE THERM IN ENGLAND.

By Dr. E. W. Smith, F.I.C.

[A Lecture delivered at the Annual Convention of the American Gas Association in Atlantic City, on Oct. 17.]

You have done me a great honour in asking me to deliver an address before your Annual Convention; and I have been considerably puzzled to find a satisfactory explanation as to why the lot should have fallen on me. It was a source of great pleasure for me to have the privilege of speaking at one of your meetings in New York in 1920; and I have come to the conclusion that, as you are desirous that someone from England should talk to you for a few moments about English experiences, you may prefer to listen to someone you know, rather than to someone else better qualified whom you do not know. Anyway, the privilege is mine: the suffering will be yours.

The Subject of the Address.

The subject of my address—kindly decided for me by my friends over here—is "Experiences with the Therm in the British Gas Industry." I am sure you will realize that it would be real presumption for me to attempt to speak on behalf of the British gas industry. I am not a typical representative, nor am I competent or authorized to speak for it. I have no doubt whatever that many of its members will differ from some of the views and conclusions I shall express to-day. I feel, however, that I can give an unbiassed account of conditions as I see them; and it is my pleasure to put them before you for what they may be worth.

If the subject be treated strictly as per title, it will be necessary to discuss the effect of the therm basis of charge on gas manufacture, distribution, sales, and gas-burning appliances. This would also include the effect on the consumer. The change has taken place so recently that it is impossible and certainly inadvisable to come to any definite conclusions as to what has been the effect of the introduction of the therm as a basis of charge for city gas. It may, however, be profitable to attempt to indicate what appears to be happening, and to have happened, in certain instances. It will be readily appreciated that no quick changes—particularly of a radical nature—can take place in methods of manufacture. Half-depreciated plant cannot, with profit, be dispensed with, whatever the inducements held out by newer systems—even if there were newer systems of coal carbonization or gasification which had prospects of giving improved results.

What can be considered improved results? In my view, any system that enables the gas engineer to—

(1) give therms to the consumer at a reduced cost, and to
(2) supply therms under more constant conditions as regards pressure, calorific value, and specific gravity,

is one definitely in the line of progress.

Fundamental Differences.

Any interest you may have in what I am saying is certain to be far removed from a purely intellectual one. The question of the conditions of gas supply and gas rates is one in which you all have a vital and very practical interest. Your fundamental problems are practically the same as ours, although the detailed causes of the difficulties with which some of your undertakings are confronted are in the main very different from those with which we have been, and are still, to some extent, confronted in Great Britain. Your statutory conditions are different. You have relatively few municipally-owned concerns. Because of the differences in the availability of raw materials, your methods of manufacture are for the most part different from ours; but you are all desirous of supplying the cheapest and most satisfactory gas consistent with a reasonable return on the capital invested. It is conceivable, therefore, that the means which might meet with some measure of success in Great Britain, for the alleviation of some of the difficulties of recent years in the British gas industry, might not be so effective if applied to the American gas industry. You are in a much better position to judge of this than I am.

The Origin of the Therm Basis.

The position that has arisen in England will be better understood if I review—what many of you already know—what has led up to the change from cubic feet to therms. It will then be seen how the sequence of events justified such a radical change. The difficulty which arose in England during the latter part of the war and the early part of the "peace" was that, owing to the high price of coal and the cost of labour and materials, the cost of production of even bad gas was so high that most of the dividends of statutory (privately-owned) undertakings reached practically vanishing point, and many municipally-owned undertakings were working at a loss, because they were not allowed to sell gas at a price higher than the maximum allowed by Parliament. This meant that the companies were unable to raise fresh capital on satisfactory terms, owing to the depreciation in value of already existing shares. Most concerns were only able to keep solvent by supplying a poorer quality of gas than had been customary prior to 1914. The maximum price having been reached, the only alternative was to maintain a reduced quality. This was only possible under a system by which gas was sold by volume. It may be asked: What about the legal standards for calorific value? As will be seen later, these were considerably reduced for various reasons; and during the war many gas undertakings turned out gases of very low calorific value indeed.

The State regulation of the British gas industry, pre-war, though reasonably effective, was extremely inconvenient and expensive. Any proposed alteration in the gas standards, or in the maximum or standard prices, was only obtained by Act of Parliament after elaborate public inquiries. This procedure had to be gone through by each undertaking requiring a change; and in 1918 there was hardly a company who could have continued a sound financial existence if they had been compelled by the authorities to supply gas up to full statutory requirements.

The period just before the war was one of rapid evolution in the gas industry in England. Prior to 1912 the calorific-value standard of testing was non-existent; but in that year two of the smaller London Companies substituted this test for the candle-power standard, which, with the rapid elimination of the flat-flame burner, was of very little value. This change, and all such changes, required an Act of Parliament until 1916, when the Board of Trade were empowered in certain circumstances to substitute a calorific for an illuminating standard. These conditions held until the 1920 Gas Act was passed, which gave us the therm basis.

Stress of War Conditions.

Prior to 1914 it was noticed in some areas that, even though gas was being supplied up to the standard, the practical results obtained in use were becoming less and less satisfactory; but between 1914 and 1917 the general standard of gas quality rapidly fell, and the adverse results—as regards increased consumptions per unit of operation, both domestically and in industry—were very marked. In Sheffield there came into being an active gas consumers' association which, with the railway companies—who are large consumers of gas—gave much publicity to the hardships under which consumers were labouring.

Gas undertakings carried on under great difficulties. They were expected to strip their gas of benzole and toluole, which reduced calorific values by as much as 30 B.Th.U. per c.ft. There was a scarcity of suitable coal, and a shortage of skilled labour, both for manufacture and repairs. This tended still further to reduce the calorific value of the gas, as the percentage of nitrogen, carbon dioxide, and even oxygen went up to previously unheard-of figures for city gas. The munitions concerns that depended largely on gas supplies soon made their voices heard; but the domestic consumer stoically put up with worse results as one of the minor difficulties of the war.

The Fuel Research Board.

In 1917 the Fuel Research Board, under the direction of Sir George Beilby, were requested by the Board of Trade to report as to:

"What is the most suitable composition and quality of gas, and the minimum pressure at which it should be supplied, having regard to the desirability of economy in the use of coal, the adequate recovery of bye-products, and the purposes for which gas is now used?"

After very full inquiry, in which representatives of the gas industry—consumers and others were taken into the closest consultation—the Fuel Research Board made their recommendation. Too much praise cannot be given to Sir George Beilby for the broad-gauge way in which he handled the whole matter. He had many difficult problems to solve; and the easiest was certainly not that of pacifying all the interests concerned. However, he has achieved the nearest approach to this desirable end of any recommendations that come readily to one's mind.

The gas industry was fretting under irksome restrictive legislation. They demanded much greater flexibility of regulations, but at the same time did not desire that the consumers' interests should be less protected. It was forcibly urged by them that the chief interest of the gas industry was a greatly extended increase in the use of gas, and that this could not be brought about if the gas industry did not fully serve the interests of the consumer. It has recently been pointed out, however, by Sir George Beilby, that as consumers are for all practical purposes entirely dependent for the protection of their interests on the conditions laid down by Acts of Parliament, one of the first considerations in fixing any new standards of quality and value must be that this protection should be strengthened, not weakened. If this is secured, then, as regards the need for the adoption of cheaper and more efficient methods of gas production, the interests of the consumers are practically identical with those of the producers, for cheaper gas can only be got by the adoption of improved methods.

Cheap and ample supplies of gas are, however, not only a benefit to the individual consumer but to the nation at large. Viewed, then, from this common ground, it was clear that all the interests concerned would best be served by giving to the gas undertakings the utmost possible freedom in the selection of the cheapest and most efficient methods of production. Having these issues clearly before them, the Board were in the position to pro-

ceed with the development of a concrete scheme, which, while safeguarding the interests of the consumers, would give to the gas undertakings the desired manufacturing freedom. On the technical side, consideration had to be given, not only to process changes which were already in sight, but to those which might result from researches known to be in progress. Experimental work showed that within a very wide range of calorific value one B.Th.U. was as good as another, subject to the consumers' apparatus being suitably adjusted. It was therefore concluded that, from the consumers' point of view, there was no objection to the granting of a wide margin of elasticity to gas concerns in their selection of standard calorific value which would best suit their manufacturing policy.

New Conditions.

Having settled this fundamental point, the Board had to consider the new conditions which would need to be imposed on gas undertakings, for the adequate protection of the consumers. There was an insistent demand on behalf of the consumers that the allowable percentage of inert constituents should be restricted. Others desired to restrict the carbon-monoxide content of the gas supplied. It can be seen that, having come to the above conclusions, it was a natural step to recommend that gas should be sold on a heat-unit basis. The gas industry maintained that when gas was sold by the 1000 c.ft. of standard calorific value, it was being sold on a heat basis. There is no doubt much to be said for this contention; but it must be remembered that in many districts the arrangements for independent testing were very unsatisfactory, and these could be much more easily overhauled and improved if completely new and more comprehensive regulations were introduced necessitating the carrying-out of regular independent tests on all gas supplied. The therm basis, therefore, came in natural sequence as a recommendation of the Fuel Research Board.

The Recommendations.

The full recommendations can be summarized as follows:

That there should be no fixed standard for composition or calorific value.

That the consumer shall be charged for the actual thermal units passing through his meter.

Gas undertakings to be free to deliver any mixture of gases free from H_2S, and not containing more than 12 p.ct. of inert constituents.

Gas undertakings to adjust appliances to burn gas supplied with safety and efficiency.

The pressure of gas shall not be less than 2 in. water-gauge at the outlet of consumer's meter.

Special conditions shall apply to bulk supplies of industrial gas.

It will be readily appreciated that these recommendations constituted a revolution in the conceptions one had of the conditions of the sales of gas. The limitations of inerts in city gas to 12 p.ct. was strongly opposed by the gas industry, as was the position determining the minimum pressure of 2 in. water-gauge at the outlet of the consumer's meter.

The Gas Regulation Act.

The Gas Regulation Act (1920) was based on these recommendations. Summarized, the Act provided:

1. For the sale of gas on the heat-unit basis—*i.e.*, the therm.
2. The Board of Trade were empowered to authorize, under specified conditions, any requirements of a gas undertaking relating to calorific value.
3. That the new standard or maximum price to be fixed by an Order shall correspond with the old one, with such additions as appear to the Board reasonable to meet increases, if any, due to circumstances beyond the control of the undertakers since July, 1914.
4. The Order may modify the provisions relating to rates of dividends dependent on price of gas.
5. Gas undertakings shall assume responsibility as to the efficiency of existing apparatus, in so far as such efficiency is affected by changes in declared calorific values.
6. That the gas shall contain no H_2S.
7. That the gas shall be supplied at an efficient pressure in the mains of the undertaking.
8. The Act provides for systematic testing of the gas for calorific value, H_2S, and pressure, by independent authorities.

The Act also gives to the Board of Trade power to make special Orders on the application of gas undertakings, and specially to extend this power to the Metropolitan gas companies.

The following are matters with which the Board of Trade may deal by special Orders:

(*a*) Supply of gas in bulk.
(*b*) Separate supply for industrial purposes.
(*c*) Authority to local authorities to supply gas outside their districts, &c.
(*d*) Authority to purchase by agreement and for joint working or amalgamation of undertakings.
(*e*) Establishment of superannuation, pension, and other like funds.
(*f*) Raising of capital and borrowing of money.
(*g*) Purchase, redemption, and cancellation of debentures, &c., or obsolete or unproductive capital, or capital not represented by available assets.

Briefly, it may be said that the procedure for obtaining a special Order under this Act consists of publishing notices containing particulars of the Order for which application is being made, and inviting objections thereto. The Board of Trade must then consider all objections made, and, if they think fit, hold an inquiry. As a result of the inquiry special Orders made by the Board are laid in draft before both Houses of Parliament, and must be approved by resolution of both Houses before they become law and are deemed to have the powers of a special Act. It will thus be seen that the Act, while carefully guarding the interests of the public and the consumer, has simplified the process by which gas undertakings can obtain modifications of their statutory powers. It is no longer necessary for them, as a rule, to promote a private Bill at great expense, or to use the complicated procedure necessary for obtaining a Provisional Order.

It will be noted that the chief differences between the recommendations of the Fuel Research Board and the Gas Act relate to:

1. The position at which minimum pressures shall be taken.
2. There is no limitation as to inerts in the Act, nor to the percentage of CO allowable; but provision is made for inquiries into these matters, on which future legislation, if any, can be based.

These inquiries were held, and will be mentioned later in my address.

The Effects of the Therm.

From what I have already said, you will be in a position to realize to some extent what were the factors that brought about the change from cubic feet of standard calorific value to therms, as a basis of charge for gas. I shall endeavour in the remainder of my address to put before you some of the effects of the therm basis in England. It must be appreciated, however, that I am far from claiming infallibility for the judgments I have endeavoured to form; and the Act is so comparatively young that at this stage in its infancy it is impossible to draw any definite conclusions as to the influence it will have on the operations of the industry which it so immediately affects. I have made it my business to discuss the subject of this address with a number of representative gentlemen who are closely in touch with various aspects of the question. Among these may be more particularly mentioned Mr. Honey, the Gas Administrator at the Board of Trade, Mr. Fottrell, the Manager of the National Gas Council, various consulting gas engineers, and one or two managers of municipal undertakings. To these gentlemen I am indebted for most valuable and interesting discussions. Nevertheless they are in no sense responsible for the views stated here, although I have no doubt most are in general agreement with what I have to say.

It must be remembered that when the 1920 Gas Act came into force, costs were about as high as they had ever been in the history of the British gas industry. As the new therm prices were to correspond with the old 1000 c.ft. prices, except for suitable adjustments for enhanced costs of production due to rises in costs of materials, labour, &c., and changes in returns for residuals, it was natural that the managements of the company undertakings whose dividends had been depleted should seek immediately to avail themselves of the new Act by making application to come under the therm basis. Those who did this early had a distinct advantage over those who postponed the event, because during the last twelve months costs generally have rapidly fallen. The Act, however, provides for cases where too high dividends are being paid because of changes in costs of production which are outside the control of those responsible for manufacture; and consumers have it in their power to obtain adjustment in all such cases. It is generally recognized, however, that cheap gas means more business and enhanced stock value; and there is little likelihood that the larger cities will take undue advantage of the inequality of treatment meted out to those who adopted the Act early, as compared with those who adopted it late—except, perhaps, in some of the smaller undertakings, in which there is thought to be little chance of obtaining relatively large increases in gas outputs. It is notable that there are many undertakings charging less for gas than their dividends would indicate.

It will be noted that there are many municipal undertakings that have not yet adopted the Act. Most of them have been late in doing so. It is natural this should be so. In the main, these undertakings do not aim at making a profit. Their sole concern should be to sell cheap gas of good quality. The therm inquiry delayed some of them, and some saw little or no advantage to municipal undertakings in the therm basis of charge. However, there is no disadvantage; and soon they will all be roped in.

Primary Tendencies.

The tendency at first was for undertakings to apply for much lower calorific values than were customary pre-war. This was due partly to the condition of plant, quality of coal, and possibly also to a lack of appreciation of the implications and consequences of the new basis. With improved quality of coal, the execution of renewals and repairs, there is a distinct tendency, in many cases, for the declared calorific values to rise rather than fall. The value of the new basis lies in its flexibility, in that engineers may, as a result of their accumulating experience, send out the quality of gas which they can deliver to the consumer at the lowest cost per therm—not per 1000 c.ft.

During the latter part of the war, and later, certain individuals advocated the production and distribution of various mixtures of

XUM

gas and air, producer gas, coal gas, blue water-gas mixtures, complete gasification gas, &c., having calorific values as low as 200 B.T.U. per c.ft., largely on the grounds that (1) such gas could be made at a very much reduced price per therm, that (2) it was possible to bring about improved aeration of such gas in atmospheric burners, and (3) that it was in the direction of greater fuel conservation. There are no signs that this excellently-organized campaign is meeting with the success that the energy expended would appear to warrant. The most promising of these proposals—complete gasification—has so far failed in its general application because (1) few gas coals can be used for complete gasification, and (2) when they can be used satisfactorily the cost per therm shows no advantage over some other well-tried systems. In fact, the new therm basis—giving as it does the knock-out to the volume basis—destroys the chief attraction most of these proposals had for many gas engineers.

Limitation of Inerts.

The Fuel Research Board originally proposed a limitation of inerts. There were those who strongly objected to any limitation. There is no need for limitation of inerts now that the therm basis has been adopted, because the whole of the advantage gained in some systems by the reduced price per therm into holder is lost, owing to increased costs between the holder and the consumer's burner, due to the attenuated calorific value of the gas and its much increased specific gravity. It is often insufficiently realized that it costs more to deliver and sell gas to the consumer than it does to make it on the works, and that on a therm basis the cost of the freightage of gas from the works to the consumers' premises is proportional to the volume occupied by the therms sold and the weight of the products supplied. High calorific value gas has a specific gravity of (say) 0·45; low calorific value gas may be double this figure. The former gas has also a proportionately smaller volume than the latter. High calorific value gas means greater capacity of holders, governors, mains, services, and meters. It means greater regularity of district pressures, and lower boosting costs. All the signs are that, taking a long view, the gas which can be delivered at the lowest cost per therm at the consumer's burner is a gas of high calorific value—(say) over 500—rather than of low calorific value—(say) lower than 450. No hard-and-fast figure can, however, be discussed. In general, any figure that might prove a good standard for the average English undertaking would with the same plant, &c., have to be reduced by up to 50 B.Th.U. in Scotland, where the quality of available coals would account for this difference in calorific value, assuming the same efficiency of manufacture. It is difficult to be anything but misleading. One notes that engineers can prove conclusively that 400 B.Th.U. gas will give the highest efficiency of manufacture, but that the same engineer is equally convinced as to the efficiency of manufacture of 450 B.Th.U. gas, after he has completed the repairs of his carbonizing plant, and the price of gas oil had dropped somewhat. Fortunately, the Gas Act allows for this flexibility of view; and the declared calorific value may be suitably increased. There is now less and less discussion in England as to what values should be generally adopted. It is recognized that there can be no uniform standard. Each undertaking has its own peculiar set of conditions of manufacture, and it is for each to determine the most efficient way of working under these conditions; it being recognized that efficiency in manufacture is not the whole story. There must be an over-all efficiency to include distribution and use. The therm basis has had an enormous educational value, not only for the consumer, but more particularly for the gas industry.

Gas engineers are still out to produce maximum profits; but the basis for such profits has been somewhat changed. The therm basis as such has not brought about this broadened outlook, which is due rather to the compulsory effect of having to change one's perspective. There is no doubt, to my mind, that there was nothing to prevent any of the improvements that have taken place occurring under the old cubic foot and declared calorific value basis of the pre-1920 period. The therm still depends on the meter and the calorific value test. There is only an academic value in reducing the gas sold in all undertakings to the same common denominator. No juggling with figures will reduce all gas to the same price per therm, nor will the reduction to the therm basis give even a rough idea as to why the gas in one locality is sold at a different price from that in another.

On the contrary, the Gas Act (1920) apart from the question of the therm—is a most progressive step for the industry; and there is no doubt that by the employment of the therm, gas undertakings can more conveniently alter their declared calorific values without altering the actual price per unit to the consumer. There would have been little difficulty, however, in changing the price per 1000 c.ft. to correspond with any change in declared calorific value; and perhaps the consumer would be better satisfied if for each drop in calorific value he were given a corresponding reduction in the price per 1000 c.ft. Under present conditions of the therm basis notice is given that the gas undertaking intends to reduce the calorific value; and the price per therm will in most cases remain unaltered. The psychological effect is not so good.

The Therm Inquiry.

You will all have read about the therm inquiry held at the beginning of the year. This was demanded by the Press and general public. Later, the gas industry supported the demand. There was no doubt that some of the electrical interests engineered this campaign; and one section of the Press was known to be after the advertising orders of the electrical concerns. As a consequence largely of the Press campaign the general public strongly supported the demand for a public inquiry. Complaints of increased gas accounts were numerous; but these came from all districts indiscriminately—districts where the therm had been adopted, and those where it had not been adopted. Consequently the troubles—in so far as they had any real existence—could not have been due to the adoption of the therm.

To what were increased gas accounts possibly due? In this connection it should be remembered that most gas-consuming apparatus in use are of fixed consumption, and are not usually regulated. Take, for example, the incandescent mantle and the gas-fire. At fixed times these are turned on and off—*i.e.*, when light or room heating is wanted. They are rarely regulated. They are usually full on, or full off. Within certain limits, if more or less light and heat are given per minute than usual, it is not noticed. If the pressure of gas is increased, a greater volume is consumed per hour. If the specific gravity is reduced, a greater volume is consumed per hour. If the calorific value be increased, the specific gravity of coal gas will almost invariably be reduced, so that with the same pressure the number of therms delivered will be increased, not only because of the increased calorific value of the gas, but also because of its reduced gravity.

The tendency during the accounting periods, in question at the therm inquiry, was to improve the service given to the consumer. Calorific values were increasing, specific gravities were going down, and pressures were increasing; and the consumer did not realize that he was getting correspondingly better service in improved lighting and pressures. It is on record that one large undertaking in England experienced a definite increase in output as and when the calorific value of the gas was increased and the specific gravity reduced. Some will claim that this is direct evidence that the higher calorific value gas is less efficient in use. In some cases this might be so, particularly where the higher calorific value is above 550 B.Th.U. In this particular case the efficiencies obtained were similar before and after the increase.

The Committee entrusted with the therm inquiry reported that, after careful consideration of all the evidence available, they were unanimously of the opinion that the method of charging for gas on the basis of its heating properties—*i.e.*, by the therm—was the best safeguard of the consumer.

> "It is abundantly clear that the system of measurement by the therm, as such, can in no way affect the price, composition, quality, pressure, or supply of gas. It is a mere method of measurement, and can have no active results."

They recommended that the therm basis be applied to all statutory undertakings within the scope of the Act, and that the consumer should be supplied with the fullest information relative to the volume, calorific value, and therms of gas consumed.

Carbon Monoxide.

Besides the inquiry into incombustibles, the Gas Regulation Act (1920) provided for an inquiry into the question as to whether it was necessary or desirable to prescribe any limitations of the proportion of carbon monoxide which might be supplied in gas used for domestic purposes. The Committee reported as far back as January, 1921, that, subject to all practicable precautions being adopted in the use of suitable fittings, and subject to town gas retaining its distinctive odour, "it is not necessary or desirable to prescribe any limitations of the proportion of carbon monoxide which may be supplied in gas used for domestic purposes." This did not satisfy everyone, however, and there was an active Press campaign, led by some scientific men who should have known better, which gave much publicity to the convenience—as a "new-world accelerator"—of coal gas containing carbon monoxide; and as a consequence the number of suicides by gas poisoning appeared to increase. This has nothing directly to do with the therm; but as most of the vicissitudes of the British gas industry since 1920 may be said to be indirectly due to the therm, I am mentioning it. It is obvious that the therm has as little to do with this matter as with most of the other things to which I have referred.

For decades the gas-meter most unjustly has been looked on as a "mechanical Ananias" by gas consumers. A very small percentage understand how gas is measured. Fewer still know what is meant by calorific values or B.Th.U.—any more than they understand electrical units. Any change of "unit" was sure to create suspicion in the minds of consumers; and one of the most valuable lessons the last two years have taught us is that no gas undertaking can afford to neglect the education of the general public in matters of mutual interest. There has been too great a tendency to envelop one's undertaking in mystery, and to come out into the open only when the concern is in difficulty. Gas undertakings are public services, owned directly or indirectly by the general public; and the general public will respond to the advantage of gas concerns, if they are taken into their confidence both in times of sunshine and in shower. Many of our gas undertakings have learnt this lesson.

Recording Calorimeters.

One of the weakest parts of the Gas Regulation Act of 1920 concerns the section relating to testing for calorific value. It was intended that this should be done by means of recording calorimeters. It was soon realized that there are no such instruments that can be relied on for an accuracy which is within the penalty limits allowed by the Act, unless very frequent check tests are carried out. Prof. Boys has recently demonstrated an instrument

which is the best of its kind; but I doubt if there are half-a-dozen men in England, other than Prof. Boys, who could guarantee the accuracy of its readings over a period of thirty days. I am fully aware that precision can be carried too far for practical purposes, for even if a perfect recorder were available it would not be capable of giving more than the equivalent of a large number of spot tests at a given point on a given main. It could not take into account fluctuations in the amount of gas passing through the main, and consequently it would not give a true average calorific value of the gas either sent out from the works or supplied to the consumer.

The regulations concerning gas examiners are altogether inadequate. There is no definition as to competence; and as almost anyone may become a gas examiner, both gas undertaking and consumer are bound to suffer. More regular testing by an independent authority—even though unreliable—necessitates a closer watch on one's own tests, which have increased in number, type, and reliability.

In conclusion, you will have appreciated that I am no enthusiast propounding the direct advantages of the therm basis. It has given many indirect advantages to both the consumer and to the gas industry; but its adoption was only warranted by the very special conditions and chaos that held in Britain at the termination of the war.

In six appendices were given the Fuel Research Board report; the Gas Regulation Act, 1920; the report by the Committee on Incombustibles; the report by the Committee on Carbon Monoxide; the report on the Therm Inquiry; and data relative to applications by gas undertakings under the Gas Regulation Act.

CONTINUOUS DEHYDRATION OF TAR AT THE GLASTONBURY CORPORATION GAS-WORKS.

A NOVEL INSTALLATION.

By D. E. Garlick, Manager of the Glastonbury Corporation Gas Department.

The following brief description of a novel method of dehydrating tar, which was put into operation at our works in July last, may be of interest to some of the "Journal" readers. The plant was supplied by the Thermal Industrial and Chemical (T.I.C.) Research Company, Ltd., of No. 52, Grosvenor Gardens, S.W. 1.

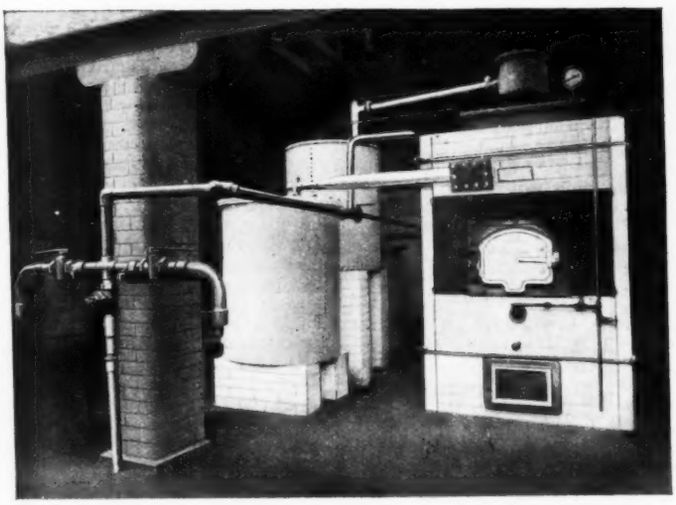
For the first 48 hours, the plant was worked under the supervision of the Contractor's Engineer, so that our staff could learn the method of control. After this the plant was started-up again and worked by our own men continuously, with complete success. The average throughput of crude tar per 24 hours was about 11 tons, having a water content of some 3·6 p.ct., and a light oil content of about 3·2 p.ct.

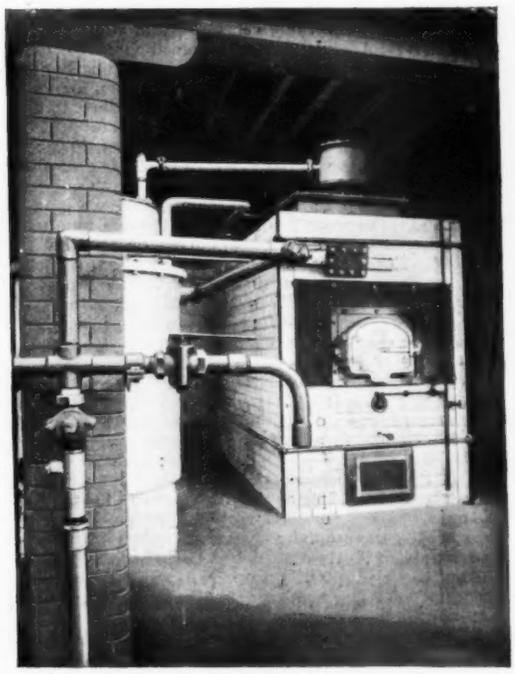
The process consists of pumping the crude tar through a coil in the dehydrated-tar cooler, where it becomes preheated by heat exchange with the outgoing dehydrated tar surrounding the coil. It then passes into the still, which consists of a rectangular mild-steel vessel, 4 ft. 6 in. by 2 ft. 6 in. by 2 ft. deep, placed in a brick-built furnace designed to burn coke breeze under steam pressure.

Instead of filling the still with tar, however, it is filled with a metal having a low melting point, and the tar is made to flow over the surface of this metal in a very thin layer. Having passed through the still, it runs-out through a discharge pipe, which conveys it to the dehydrated-tar cooler. From this vessel it runs by gravity to either of two barrel-filling devices or to a storage tank, as desired. The light oil and water vapours driven off the layer of tar pass away from the top of the still to the condenser, and then to the separator, and the light oils pass on to storage.

The whole installation, including the heat exchanger and condenser, occupies a floor space of 10 ft. 6 in. by 10 ft. 6 in.; and the highest point of the apparatus is only about 9 ft. from the ground level. It was therefore possible to house it in a small open-sided building which we had available. The plant works at ordinary pressures and temperatures, and is surprisingly simple to control. The only points requiring attention are the supply of crude tar to the plant, the firing of the furnace, and the provision, filling, and removal of the barrels for the dehydrated tar. It was found that one man could easily manage this work.

There are several distinct advantages in filling the still with the metal of low melting point just referred to. In the first place, owing to the difference in gravity, the tar travels over the surface of the metal in so thin a layer that no priming can possibly occur, and it appears likely that tars containing a very high water content can be as easily handled. The heat from the furnace gases passes through the walls of the still to the metal within, which is so good a heat conductor that the whole of the bottom of the still is always uniform in temperature, and no local heating is developed. The tar, of course, never comes in contact with the heated still walls, and no deposition of carbon, &c., can therefore take place. This should prolong the life of the still very considerably.





TAR DEHYDRATION UNIT AT GLASTONBURY.

Capacity—10 Tons per 24 Hours.

There appears to be sufficient reserve of heat in the bulk of metal in the still to cause it to act as a kind of balancer, so that any possible unevenness in working conditions—due to variation in rate of throughput, composition of tar, or varying furnace temperatures—is not noticed, and does not require immediate attention. Even in the very unlikely event of the feed pump stopping, nothing more serious can happen than a gradual rise in the temperature of the metal and the possible coking of the thin layer on the top. This can easily be removed from the surface of the metal through an inspection opening in the top cover.

In treating the tar in the form of a very thin layer, the maximum rate of heat transmission is obtained, and consequently the size of the still is quite small in relation to the throughput. The metal is maintained at the required temperature of dehydration, and there is practically no temperature difference between the outgoing dehydrated tar and the metal.

Gas Companies' Protection Association.—The date of the 26th annual general meeting of the Association is Thursday, Nov. 22, at 3 p.m., in the Caxton Hall, Westminster. The annual report and accounts will be submitted, and officers elected.

THE INSTITUTION OF WELDING ENGINEERS.

Last year reference was made to the formation of this Institution (see "Journal," Vol. CLVII., p. 265), the first ordinary meeting of which took place last Wednesday week at the Holborn Restaurant, when the chair was taken by Sir W. Peter Rylands, J.P. (the President). The inception of this new Institution has been marked by adverse criticism in certain quarters; for there are many who affirm that, in view of the existing closely-allied associations, the establishment of a new organization is not justified. However, the application of a new idea invariably evokes hostility; and the obvious enthusiasm of the gathering at their first meeting augurs well for the future stability and extended usefulness of the Institution of Welding Engineers.

In his presidential address, Sir W. Peter Rylands, though not overlooking or minimizing the magnitude of the task upon which the Institution have embarked, pointed out that the welding industry was daily becoming more important, and that, as time passed, the field of its activities widened. In this respect there will be general agreement. In the gas industry, for example, the use of steel and wrought-iron tubes for main and service laying has advanced considerably during recent years; and the jointing of these pipes may be done simply and cheaply by the welding process, which method has brought the industry within measurable distance of a distributory system, at any rate as far as the smaller sizes of main are concerned, without any joint at all, as hitherto understood. The prospect has thus been opened-up of the elimination of much of the unaccounted-for gas, and the distribution of gas in the safest possible way. The outstanding advantages of welding joints are the reduction of leakage, the increased strength of the lines, and the lower cost, together with more rapid progress in construction work. As proof of the efficacy of welded joints a statement made by Mr. E. E. Lungren in an address before the twenty-third annual conference of the International Acetylene Association at Chicago may be quoted. He states that "the welded joint, when properly made, is as impervious to leaks as the pipe itself, and when found to be perfect on its original test, there is positive assurance that no leaks will develop in service. This statement is substantiated by experience with 172 miles of welded pipelines, ranging in size from 1½ to 12 in. diameter, the greater part of which is carrying gas at high pressures, and which has been in service from one to seven years. There has been practically no maintenance work on any of these lines; and it is known from examination of a number of the joints that they are in as good condition as on the day they were installed." Rapid repairs to boilers, tanks, shafting, steelwork, and castings generally can be made by the welding process; and it is of interest to mention the welding of an entire new crown on a gasholder of a capacity of 30,000 c.ft. at the Western United Gas and Electric Company. This work was carried out by the oxy-acetylene process.

There are three main methods of welding—oxy-acetylene, electrical, and oxy-town-gas. In the two former cases it is necessary to have equipment of a more or less elaborate nature, whereas with the latter only a blowpipe is necessary. For each of these methods a sphere of usefulness exists; and the President emphasized the fact that it was the duty of the Institution to deal with all in an impartial spirit. With regard to the application of electric welding in the gas industry, attention may be drawn to a paper presented at the annual convention of the Canadian Gas Association by Mr. J. N. Reeson, M.Inst.C.E., which is published in this issue of the "Journal" (see p. 260). The author of the paper in question describes the successful adoption of the "quasi-arc" method for the welding of gasholders.

Following the presidential address, two papers were read before the Institution—one by Mr. E. A. Whittaker, entitled "Practical Applications of Gas Welding;" the other by Mr. D. T. Smout, on the "Theory and Facts to Aid in the Choice of an Efficient Electric-Arc Welding System." In the first-named paper, the author stressed the necessity of the operator's having a thorough knowledge of the effects of expansion and contraction in regard to the construction of special pipe connections, and offered many useful suggestions of a practical nature. Mr. Whittaker has had considerable experience with this class of work; and the district in which his works are situated is served with a high-pressure gas supply, which is conveyed to outlying districts in steel mains approximately 70 miles in length. He has had personal interest in this installation, and superintended the construction and laying of these mains, which have given entire satisfaction. One line in particular has been in continual use for ten years without a single record of failure.

Southern Association of Gas Engineers and Managers.—Members will make a note of the fact that the annual general meeting of the Association will be held on Tuesday, Nov. 27, at the Charing Cross Hotel, Strand, at 2.15. Tea will be served at the conclusion of the meeting.

The Late Mr. Samuel Cutler's Will.—Mr. Samuel Cutler, of Lewisham Hill, Blackheath, Chairman of Messrs. Samuel Cutler and Sons, Ltd., contracting engineers, Providence Iron-Works, Millwall, and Victoria Street, Westminster, who died on Aug. 5, aged 79, left £201,859 gross, and £200,594 net. There were various charitable bequests.

RESEARCH WORK IN GERMANY.

Some interesting light is thrown on the present-day trend of research work in connection with the gas industry by the report presented by the Gas Institute at the recent annual meeting of the German Gas Association.

The undertaking known as the Gas Institute is an experimental and research station conducted, on behalf of the Association, by Prof. Karl Bunte at Karlsruhe. In addition to the general research work carried out, the experts at the Institute are at the service generally of the industry, undertaking anything from simple analyses of spent oxide or sulphate, for a small works which cannot employ its own chemist, to a seven days' running test of large units of carbonizing or other plant in any part of the country. Since the Institute is supported by the industry itself, charges made to individuals for such work are very little above the actual material costs, and, it is claimed, considerably below those of private laboratories. Another useful branch of the Institute's work is the holding annually of a "refresher" course, lasting about twelve days, for the higher officials of gas undertakings. In a series of lectures, all that is newest and best in the chemical, manufacturing, and management branches of the industry is conveyed to those who take part.

Coke Quality.

As regards general research work, much attention has been devoted during the past year to endeavours to improve coke quality. Of interest to the gas industry generally, this question is of special significance in Germany at the present time, if the best use is to be made of all the various types and qualities of coal with which the German gas engineer has to deal in these days. The Institute set itself to solve the question: How is the value of coke from the fuel-technical standpoint to be gauged, and how can the quality of the coke be influenced during the carbonization process?

The answer to the first part of the question, in the opinion of the investigators, is that the fuel value of coke depends upon its "capacity for reaction." The more easily a coke burns, the more readily can its combustion be regulated in domestic stoves and central-heating apparatus, the more suited it is for rotary grates, the better it serves for the producer and water gas processes.

Starting from this point of view, it was next sought to ascertain whether, and to what extent, there is any variation in the ignition temperatures of different coking products. Work carried out by Bunte and Kölmel* showed that such variations are surprisingly great, and suggestions were made as to their possible causes. It has further been discovered that the capacities for reaction of various cokes show equally considerable differences. It is clear that the different ignition temperatures are not dependent upon varying gas contents caused by differing degrees of carbonization. Any possible connection with the degree of fineness of the composition of the coke substance is now being investigated by means of experiments on the absorptive capacity of various cokes. If, as can safely be assumed, the fineness of composition of the coke substance determines its ignition temperature and its capacity for reaction, the further question arises as to how the coke structure can be influenced by the adoption of special measures during carbonization. The formation of the coke structure takes place in the temperature zone somewhere between 450° and 600° C., in which the coal is in a state of flux. Therefore, data are required as to the influence on the structure of the coke of the speed at which this region of temperatures is passed through. If the idea proves correct that a slow passage is most favourable to the formation of a coke of fine composition yet solid enough—*i.e.*, a coke of fine pores—then the question arises as to the behaviour of the bitumen between 20° and 400° C. In other words, at slowly increasing temperatures, will the bitumen remain unchanged and maintain its full agglutinating power until the critical period for coking is reached?

Such matters are at present being probed with reference to the products of various methods of carbonization, in an endeavour to discover the relation between their behaviour in the producer-gas (reduction of the CO_2) and the water gas processes, and their "capacity for reaction."

Benzole Extraction.

This is a subject which is of greater interest probably at the present time to German gas men than to English; and its practice is constantly on the increase over there. Consequently, it has received a considerable amount of attention at the Gas Institute; and a few points are worth mentioning here.

During the war, a German committee of experts was formed to decide what should be the standard quality of the oil used for benzole extraction. Depending largely on the long experience of coke-ovens, it was laid down that the oil should not contain more than 10 p.ct. of naphthalene. This, however, was based on the assumption that only normal tar-oil fractions enter into the question. Experience has shown that in certain circumstances something more is needed. If a considerable proportion of the oil is assignable to the lower fractions, there is a danger, owing to the higher vapour tensions, of rapid and serious shrinkage of the oil. This upsets the calculation as to permissible naphthalene content. On the other hand, if there is in the oil a big proportion of high-boiling fractions, its washing efficiency is less, and thickening sets

* See "Journal," Vol. CLX., p. 39.

in sooner. Besides this, there is always the danger of the anthracene percentage becoming too high, which leads to troubles of another kind. The Institute is giving detailed attention to the influence of different compositions of the washing oil.

Interesting experiments were carried out which proved that the oil attacks lead to such an extent as to render it highly inadvisable to introduce lead into any of the joints of the benzole plant. For the purpose of estimating condenser capacities, the specific heat of the oils used was determined and put down at 0·405. Other investigations are almost complete as to the coefficient of heat transference from washing oil to iron.

These are only a few examples of the work which the Institute has in hand. And, with enlarged premises now in full swing, the gas industry may well expect a continued and increasing output of valuable information.

MIDLAND JUNIOR GAS ASSOCIATION.

The Opening Meeting of the session of the Association was held in the Reading Room, Council House, Birmingham, last Thursday evening. There was a very large attendance.

The HON. SECRETARY (Mr. H. R. Hems) stated that twelve new members had been approved by the Council; and Mr. C. F. W. RENDLE (the retiring President), who occupied the Chair at the outset, remarked that this membership development was a matter of much satisfaction.

Mr. RENDLE said he accepted the office of President a year ago with misgivings, and what little success may have been achieved was due to the members. He greatly valued the team work displayed, and also the extremely good feeling, and hoped the spirit of camaraderie would develop. He appreciated, moreover, the timely suggestions (the outcome of his experience of Junior Association work) made by Mr. W. J. Pickering, and the generous support of Mr. Hems, as Hon. Secretary. ["Hear, hear."] In introducing Mr. L. H. Thomas, the new President, he spoke of his enthusiastic work on behalf of the Association, and said he was a man of sterling qualities, whose name would be well known in the gas industry before long.

THE NEW PRESIDENT.

Mr. L. H. THOMAS, on taking the Chair, was warmly applauded. He desired, he said, to acknowledge, on behalf of the members, the splendid work of Mr. Rendle during his year of office. His engaging personality had dominated the Council and ordinary meetings of the Association. He felt that a large part of the success of the Association during the year was due to him, and moved that a hearty vote of thanks be accorded to Mr. Rendle.

Mr. H. CLARK (Derby), Senior Vice-President, seconded, observing that Mr. Rendle had made an ideal President.

The vote was carried with enthusiasm.

Mr. THOMAS then read his

PRESIDENTIAL ADDRESS.

The Junior Gas Associations stand on the threshold of a new era. We have for years talked of education in the industry. My predecessors have for several years looked forward to the time when the education of men entering the gas industry would be pursued along well-organized definite lines; and since the Junior Gas Associations have taken such a large part in urging the establishment of a comprehensive scheme for education, we have a sense of justifiable pride in the knowledge of its adoption. The details of the scheme follow fairly closely those outlined by the Junior Gas Associations, and are, on the whole, admirable. Every class of student is catered for, and the insistence upon the study of subjects which are ancillary to the main ones is commendable.

The method of deciding the proficiency of a man for the award of the diploma is one of the best combinations of tests known to educationalists, and if well conducted, as we believe it will be, should prove of great service to the members of the profession and to the industry itself. By it, the man who relies solely on a retentive memory and cramming will be eliminated. The man who knows his subject, but is not good at quickly writing down his knowledge, will be helped; and there is opportunity for the man who has exceptional ability and originality to show these qualities. The tests will be difficult, but there will be greater honour in passing them; and the difficulty itself becomes, on the moral side, a further test. The man who shrinks from the attempt because of the difficulty is not of the type to hold successfully the highest positions in the industry; but the man for whom the obstacles call forth his best, and who feels that such tasks are made to be overcome—the man who feels the thrill of the motto of G. F. Watts, R.A., "The Utmost for the Highest"—is the only one morally fit to hold these offices.

In every other branch of engineering, examinations have been inaugurated during the last few years for admission to membership of the various institutions, and we hope that when this education scheme is properly at work the holders of the diploma will be admitted to the Institution of Gas Engineers. Again, in these days of specialists, there have been formed Salesmen's Circles for those of our members who represent us to the consuming public; and while the scope of their activities is only one small part of ours, yet they can get down to details and study their own special line in a way that would be impossible in our more comprehensive organization. All these advances must have a great reflex influence on our Association; and I think we can confidentially look forward to increased interest, greater usefulness, more pertinent discussions, and a general increase in the status of the Association. But we must realize that while the education scheme is *un fait accompli*, it is not an end in itself, but only a means to an end. We cannot rest on our oars, feeling that we have passed the mark; the joy of living is in striving, not in achievement.

One good feature of the education scheme is the oral examination for the diploma, and I think that the discussions at our meetings are very helpful to anyone who is hoping to obtain a diploma. In the first place, the discussions cover a great part of the technical details connected with gas engineering and supply, and, further, one gets accustomed to talking about technical subjects. Sir James Barrie had said: "The man of science is the only man who has something to say just now, and the only man who does not know how to say it." While we should expect to see a whimsical smile about the mouth of Sir James as he uttered this exaggeration, there is without doubt some truth in the statement; and the best training ground for the art of expressing oneself clearly on scientific and engineering problems connected with the gas industry is indubitably the Junior Associations.

While we do not intend in any way to compete with technical colleges and schools as an educational authority, we realize the immense educational value of our Association; and your Council have therefore decided to show their appreciation of the scheme which is being inaugurated by endeavouring to render assistance to those men who are seeking the highest honours of the scheme. It is with this end in view that we again propose to have a few informal meetings at which very short papers will be read on vital subjects. While we are sure that the meetings will profit by the reading of the paperettes, we are hoping that men who have shrunk from reading a long paper will prepare a short one, and so pave the way for a longer and more advanced treatise at a later date. We also propose to throw open each ordinary meeting at the close of the discussion relative to the paper or lecture which has been read for questions on any subject connected with the wide ramifications of the industry. We have among us specialists in every branch of the industry, and as far as possible the question will be answered by those who are competent in the branch to which the question relates. There will be ample opportunity for our younger members, whether they are studying for examinations or for their professions, to gather many useful ideas and much valuable information.

But modern educational practice has proved that expression, rather than repression or cramming, is the best method. To talk about the ideas you have received and the facts you have had presented to you impresses them firmly on your mind; and these proposals cannot be of any great value unless our younger members overcome that reticence which marks most young men. Why give the impression that you have nothing in you, when you have? Careful pointed discussion adds to your personal renown, and helps the work of this Association tremendously. After all, we are not dealing with exact science. Text-books do sometimes, by the dogmatic way in which facts are presented, lead some of us juniors to think that the last word has been said on the effect of certain processes, and the working of certain types of plant; whereas, if you get into touch with men who, under different conditions, in different works, have used these processes, you will often find very little agreement in the results of their working. All get a saner and more balanced view of things when expressions and ideas are freely shared, and this is one of the chief reasons for the existence of our Association.

COMPETITION WITH ELECTRICITY.

Another matter which should make us all keener, is the increasing competition with electricity. In this great age, which Sir Oliver Lodge has recently described as a second Newtonian age, physicists have discovered that electricity is at the root of all things, and that even the atom is a solar system in which electrons whirl round a proton or nucleus. The newspapers have continually published popular accounts of these discoveries; but have led the non-technical public to believe that electricity is a sort of philosopher's stone, especially when schemes for the building of super power stations in all parts of the country are backed by Government committees. The public mind is prompted to think that it is looking ahead in installing electricity. There is also a very potent factor in the call of fashion. It has become a fashion in some parts of the country to instal electric light; and since Dame Fashion has such a strong influence with many of those who rule in domestic affairs, it is up to us to counteract this influence by careful propaganda, and to prove the cheapness and suitability of gas compared with electricity in most districts.

The building of super power stations, where electricity is to be produced for a halfpenny per unit, necessitates a big increase in output; and the electric supply companies are making great efforts to push the use of their product. We acknowledge that there are many duties which can be better fulfilled by electric motors than by any other kind of power plant. Their ease in starting, the smallness of the plant for a given power, the small attention required, their superiority for travelling machines, are all factors which make them more suitable under certain conditions than gas, oil, or steam engines. In the gas industry we actually acknowledge this by installing electric motors on many plants.

When electricity can be generated by water power, or by waste heat, or by exhaust steam, it may be produced sufficiently cheaply to be exclusively used in a district; but so long as only from 45 to

60 therms of heat can be obtained from a ton of bituminous coal in the conversion to electricity, and nothing but ashes remain, and we can produce 70 to 80 therms of gas and 140-150 therms as coke from a ton of coal, and all the vast products of tar and ammoniacal liquor remain, it can never be truly said that the conversion of coal into electricity is a part of the national ideal of conserving our coal measures. These figures are based on a medium-class coal, such as is used in gas-works. Usually, electricity generating stations are run on a poor fuel, often slack mixed with coke breeze; but the erection of many super power stations will necessitate the use of a higher-grade fuel. The cost of electricity is reduced by using a poor-class fuel; but when considering the thermal efficiency of generation, it is only fair to allow for similar fuels.

These facts are well known to most of you, and I am presenting them again because I have several times heard the average man suggest that it will not be many years before gas supply is a thing of the past. In such cases I have talked as long as his patience lasted, proving that so long as electricity was produced in this country by the burning of raw coal, gas must be pre-eminent—at least for heating purposes. When you find articles in the daily newspapers stating on good authority that in twenty years the face of Lancashire would be transformed by the building of super power stations, and that all power and lighting would be electrical, you can understand his getting this misconception. But he fails to understand that a horse-power hour costs about twice as much if produced by an electric motor from the town supply, as if produced by a gas-engine from town gas, and that, per candle-power hour, electric lighting, even by the latest half-watt gas-filled lamp, is as much again as by the ordinary inverted gas-lamp, and that, when compared with high-pressure street lighting, the difference in cost per candle-power-hour is much increased in favour of gas.

When we consider the question of heating, electricity cannot compete except in exceptional circumstances. There are a few industrial processes which can only be carried out by means of the electric furnace; but the majority of heating operations can be performed as well by the gas-furnace as by any other type, and some are much better negotiated by gas. An electrical unit only contains 3410 B.Th.U., or 0·034 therm, and the cost of a therm for heating when produced by electricity varies from 44d. to 88d., while 1000 c.ft. of gas give 4½ to 5 therms at a cost varying from 6d. to 3·12d. per therm. We know that the efficiency of gas-apparatus is not so high as that of electrical appliances, but for the same cost the former only need have an efficiency of 7 p.ct. In many types of apparatus it reaches more than ten times this figure.

I feel very strongly that all interested in the use of gas should have these facts fixed in their minds, in order to counteract the systematic canvassing, which is on the increase, and will continue, for installing electricity in premises. Of course, salesmen know them; but in their business capacity they usually meet people who are users of gas and who are likely to remain so. All of us in our private life meet with people who have the idea that gas sales are decreasing, and that electricity will be the only source of light and heat in the not far distant future; and when they expound their false ideas, we should be able to convince them that they are wrong. Personal propaganda is the most efficient form of advertising; and we Juniors can do much by showing that the gas industry, rather than being on the decline, is increasing in public usefulness. The keener competition with electricity should also make us look round for any improvements likely to increase the saleability of our main product—gas.

POINTS TO WATCH.

For lighting, one of the chief necessities is the elimination of all sulphur compounds. This is of great importance, and should be one of the problems of the works man. Processes for solving this problem are already at work, though rather costly. Fortunately we know that many of the best minds in the industry, fully alive to the importance of the problem, are working on it; and we may expect that before long one or more processes at reasonable working costs will be introduced. Many people think that electric lighting must be much cleaner than gas because of the corrosion of, and deposit on, fittings, which is chiefly caused by the very small amount of sulphur which goes forward.

An appliance much needed is a really satisfactory wall switch. The pneumatic switch now in vogue is a good article, but it can be improved upon. The distance switch is a great asset to electric light, and there should be one for gas-apparatus as reliable and easy to use as the electric switch. We have to educate the public in the correct use and adjustment of bunsen burners; and this, I think, is much better than a very elaborate scheme of mantle maintenance. In the design and use of other gas-apparatus—cookers, fires, irons, water-heaters, furnaces, &c.—when considering the recent advances which have been, and are continually being, made, we feel that we are well in front of any competitive plant; but there is need for more careful design, so as to produce even higher efficiencies.

As pointed out in the discussion which closed last session's proceedings, the industrial heating load is one which should be avidly sought by our outdoor staffs. Even at the present time, in all our large cities, where cooking and industrial heating has been increased during the last few years, the output of a typical winter day is about twice that of a typical summer day, which means more plant is idle than is necessary to carry out repairs, and considerably increases the cost of manufacture, since standing charges, interest, and depreciation, &c., are spread over a smaller make. The load factor does not mean so much to us as it does to our electrical supply friends, especially if we have water-gas plants and large holder capacity; but it should nevertheless be borne in mind by the sales staff in deciding in which direction their most vigorous pushes should be made. Even in the most efficiently organized works, to start up a water-gas machine at short notice, and then to shut it down again soon after, is very costly; and to slow-down extraction and reduce steaming on vertical retorts considerably increases the cost per therm.

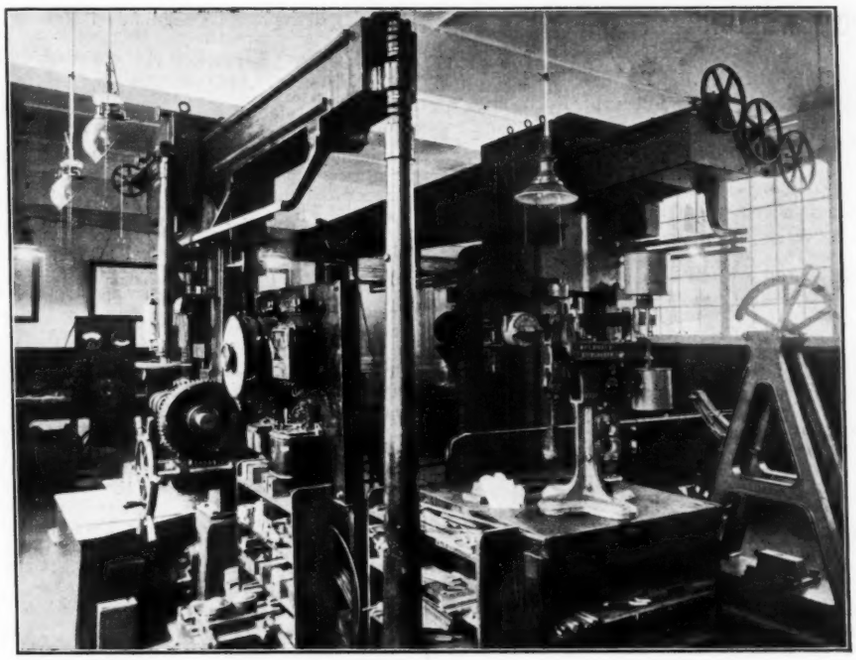
Another field which is being developed is the use of town gas for generating electricity for lighting public buildings and large stores. There are many advantages in the use of electric light in these places; and when those in authority decide that these advantages are such that they will instal electric fittings, we should be able to prove to them that, instead of paying the high rates for current for lighting, we can supply them with gas at the lower power rates, and that they will be able to produce their current at lower cost than they could buy from most electric supply stations. This again will help our load factor by increasing the night load. The consideration of a high load factor is an ideal, and one that should not at present be pushed too far, since the vagaries of our English climate may make demands which upset our best calculations; but it should be retained in the minds of those who organize the sales side of the industry. While, as I have previously suggested, we may in this great age expect that new processes of gas manufacture and purification will become perfected, we must not, on the works, wait Micawber-like for something to turn up.

The plant we have to work must be used at the highest efficiency, and the works organization must be of a high standard. One often finds elevating and conveying machinery working at 60 or 70 p.ct. of its maximum rated capacity, when a slight alteration to the feeding arrangements or to some other detail of the plant would enable it to carry continuously its full load. The labour charges of handling are then, of course, reduced by 40 or 50 p.ct. It is sometimes thought that wear is reduced by running light; but, actually, the extra time required for elevating or conveying is sufficient to cause more wear on well-lubricated machinery than running for a shorter period at full load. In the careful scientific control of works plant, Junior Associations can, and do, point the way to higher efficiency.

The rule-of-thumb method of designing and running a works is being replaced by scientific design and control. Rule-of-thumb, and "cut and trial" methods, ought not to be despised, since they have led the way to much of our accurate knowledge of the present day. Some time ago, I was looking through tenders for water-tube gas-condensers, in which the details had been left to the makers, so that they could use their standard construction and patterns. They were told the inlet and outlet temperatures of the gas, the capacity, and the inlet temperature of the water. I was surprised to find that in one case the heating surface was about double that of another maker, the others coming somewhere between these two. Making allowances for differing standards of construction, it seemed obvious that some of these had been based on previous experience, without any careful calculation at all. The purchaser must be able to calculate which size is most suitable for his own use, or he may have a plant which is too small, or be paying extra for one much bigger than he needs.

While considering condensation, there is another matter which in these days of steamed vertical retorts should not be lost sight of. A short time ago, there appeared in a trade paper, in answer to a question on condensation, a reply which gave the heat units to be absorbed in cooling gas, without giving any indication of the actual initial or final temperatures of the gas. While it may have been a satisfactory answer to the particular question, it is misleading, because the heat content of a saturated gas does not vary as the temperature. Theoretically, a saturated gas at 212° Fahr. has an infinitely great heat capacity; and while this cannot be actually obtained, yet in steamed vertical retorts, where liquor is often sprayed or dribbled into the foul mains, there is a large amount of vapour in the gas which is at a high temperature. The heat given up by a cubic foot of saturated gas cooled from 100° to 65° Fahr. is 2·86 B.Th.U., but if cooled from 135° to 65° Fahr. it is 11·41 B.Th.U. Coal gas at a temperature of 135° Fahr. would not usually be fully saturated, and the estimation of the saturation of a foul gas is difficult; but by measuring the amount of liquor condensed in actual practice, where a liquor spray is used in the foul main, I have found that at 135° Fahr. the saturation is about 84 p.ct., and that the heat given up in cooling from 135° to 65° Fahr. is 9·21 B.Th.U. per c.ft.—*i.e.*, more than three times that given up in cooling from 100° to 65° Fahr.

In considering the size of condenser required, one is confronted with the difficult problem of heat transmission through tube walls. Much valuable work has been done in this direction for boiler tubes and plates, and for steam condenser tubes; but in one case the temperatures are vastly different, and in the other case the tubes are clean. The transmission of heat has been proved to be greatly diminished in boiler practice by a thin scale on the tubes; and while the temperatures of boilers are so high as to render the information available of little use to us, yet we are up against the same problem, since we know that as soon as the condenser is put to work there will be a film of tarry matter on the tubes. This makes it difficult to carry out experiments to find the relation between velocity of water and heat transfer; but in surface condenser



THE NEW 100-TON TESTING MACHINE.

practice, where temperatures are comparable with those of gas cooling, about 445 to 625 B.Th.U. per sq.ft. per ° Fahr. are transmitted per hour—the lower figure with a water velocity of 1·64 ft. per second, and the higher with a velocity of 5 ft. per second. This makes the figure of 6 B.Th.U. per sq.ft. per degree Fahr. per hour given by J. Harrg, in America in 1914, and quoted by Mr. Meade in his "Modern Gas-Works Practice," appear very low; but it must be remembered that the tar film reduces the transmission by an enormous amount, and that it has always been considered correct in gas-works practice to avoid shock cooling. In the report of his investigations given in the "Gas Journal," there was no mention of water velocity; but with a velocity of 1·64 ft. per second, I have obtained a transmission of 16 B.Th.U. per sq.ft. per ° Fahr. per hour. Usually, the water flow of a multitubular condenser is in the neighbourhood of 0·002 ft. per second.

Now that we no longer use illuminating-power standards, and since Dr. Carpenter has found that a good way of extracting naphthalene from the gas is to cool it rapidly, and spray the gas tubes or chambers with tar, it should be possible to design a condenser much smaller than now used, if clean water is available, employing a much higher water velocity, providing that most of the heavy tar fog is removed in such an apparatus as a cyclone extractor. The heat transmission would be such that the outlet water would be at a temperature of only 10° or 20° Fahr. below the incoming gas; and shock would be avoided. It would be possible, by spraying the gas-chambers, to get rid of the naphthalene; and the reduction of hydrocarbons should not be great. In this way the cost of condensers would be greatly reduced.

I have talked in this manner to show the younger members of the profession, who are interested in design, that there is no need to wail because in the gas industry there are no new worlds to conquer. The gas-condenser is one of those plants of which one rarely sees the inside. It is put to work and stands there for years with gas flowing through in one direction and water in the other. All the attention it needs is the adjustment of the water supply according to the outlet temperature of the gas, and a thermostat can now be fixed to do this automatically. One could be on a gas-works for years without ever questioning the design of a water condenser. If we Juniors are to make headway, and to improve the status of the industry, and give the best service possible to the public, I would suggest that we should challenge the efficiency and suitability of every operation, every item of plant, and every appliance with which we have to deal, always remembering that we are pitting our brains against the cumulative experience of years. We must give way to that experience unless we can prove from first principles or by careful experiment that it is not achieving the best. This attitude of constructive criticism is not derogatory to the great men of the past. We have a great and a noble succession from the reckless, daring Scotsman who first successfully used gas for lighting to the great minds of the immediate past; and it is only by improving upon the legacy which they have left to us that we can claim to belong to that succession. We must approach the many problems of our day, as they did in theirs, with daring spirits, open minds, keen intellects and untiring zeal. The progress of the industry will then be assured.

A Vote of Thanks.

Mr. Rendle moved a vote of thanks to the President for his address; and this was seconded by Mr. E. Hardiker (Smethwick), supported by Mr. W. J. Pickering, and carried with much warmth.

The President said he would be more than repaid for any trouble to which he had been put in preparing his address, if it served in any way as a stimulant. He cordially welcomed among them Mr. B. J. Bell, of Cardiff.

Visit to the Industrial Research Laboratories.

After the meeting, about forty members adjourned to the Industrial Research Laboratories of the Birmingham Corporation Gas Department, where an explanation and demonstration were given by Mr. V. E. Green, A.M.Inst.C.E., Assistant Engineer, of the recently installed 100-ton testing machine. The specimens tested were lengths of steel tubing and concrete blocks They were compressed by the machine until breakdown took place; one of the blocks, which was 6-in. cube, taking about 63 tons.

The testing machine is of the vertical single-lever type, electrically driven through spur and worm reduction gearing. The travelling poise, of a total weight of 2 tons, can be propelled electrically during the loading-up of the test specimens. This poise is split into three portions, so that the machine can be used for capacities of 100 tons, 50 tons, or 25 tons, over full-scale readings.

The machine naturally takes-up a large amount of space in the laboratory, and it was necessary to build a special pit about 6 ft. deep to take the base, the driving motor, and the electrical control panel. All the controls can be easily operated from the working platform, from which a view of the specimen under test is also obtained. It was explained that the machine had already been used for carrying out tensile tests on large steel tubes, steel bars, compression tests on granite blocks, concrete, and railway wagon springs, and for bending tests on tramway rail joints, cast-iron water pipes, and large diameter case-hardened bars.

At the close of the inspection, a vote of thanks was proposed by Mr. Thomas and suitably replied to by Dr. C. M. Walter, Engineer-in-Charge of the Laboratories.

A New Rust-Proof Preparation.—The absorptive property of iron, steel, and other bright metals, is utilized in a process for preventing rust and corrosion, recently introduced by the Rowe Chemical Company, of No. 13, Newbury Road, Hale End, London, E. 4. The liquid compound used, known as "Rustofite," is claimed to impregnate the minute pores of clean metal with hard transparent and invisible crystals, which are electro-negative to such corrosive influences as acid-fumes, brine, rain, smoke, spray, and tropical and arctic climates. The compound is both non-inflammable and non-poisonous, and the process can be operated by an apprentice. The cost of a complete outfit for rustproofing 2000 sq.ft. of metal is computed to be less than one farthing per sq. ft.; and it is claimed that one gallon will save 500 working hours at present expended in cleaning, wiping-down and packing for storage, and will prevent general depreciation of plant and stock. The process is also available for rustproofing finished products. We have received from the manufacturers a sample of this preparation. Its application is a simple matter either by dipping or by means of a brush; the only precaution to be observed being to ensure clean surfaces before applying the "Rustofite."

"QUASI-ARC" WELDING OF GASHOLDERS.

By Joseph N. Reeson, M.Inst.C.E., Engineer-in-Chief to the Metropolitan Gas Company of Melbourne, Australia.

[**A Paper presented at the Annual Convention of the Canadian Gas Association, in Ottawa.**]

While necessarily confining my remarks to the structures which have been fabricated with welded joints, as against riveted ones, in Melbourne, with which my name has been associated, I think I may safely say that, as far as gasholders are concerned, those erected in Melbourne are not only the first structures so fabricated in Australia, but also in the world. Let me say at once that, in my opinion, the advantages of the new method of construction are so great that in a few years' time no new structure of any kind will be riveted.

The question of welding, as against riveting, joints, whether of sections, plates, or sheets, in any position, may be said to have been first considered by me some six or seven years ago; for it may be mentioned, in passing, that during the past nine years no fewer than six gasholders, ranging from 500,000 c.ft. to 3,000,000 c.ft., have been either constructed wholly or reconstructed in Melbourne. This work, though large in itself, was performed principally during the time the world war was in progress; and, though efforts were made to induce European firms to tender, it was found that none was able to undertake the work. To accomplish this, then, in Australia, by outside engineering firms was impossible; and thus it came to pass that this Company (the Metropolitan of Melbourne) had perforce to undertake the work of construction themselves. Extensive fitting and constructional workshops had to be erected, tools provided, and skilled workmen and a highly efficient draughting staff trained from material which had probably no knowledge of gasholder construction previously.

The first experiments in welding were confined to the jointing of sheets, as it was early appreciated that the single riveted joint ordinarily employed was lamentably weak; and numerous tests were made which demonstrated this and other serious disadvantages. For some time oxy-acetylene welding was employed; but it was ultimately discarded as unsuitable, largely owing to the difficulty of overhead welding—as, for instance, the under-side joints of the crown sheets. Attention was then directed to the use of electric welding; and numerous experiments—some 250—were made to test various types of joints and electrodes. Ultimately that employed was what is known as the "quasi-arc" process. From the tests the tensile stress of the joints made was invariably found to be equal to, if not greater than, the sheets themselves. There were few operators available, and those who professed knowledge of welding were not always suitable; and ultimately the training of the welders themselves had to be undertaken by the Company's own staff. At the present time there are twenty-three expert welders operating; and these men have become exceedingly expert. Their work is examined by two foremen also trained by the Company.

The first holders built were with riveted joints; and it was not until 1920, when the collapse of a 3,000,000 c.ft. gasholder at the South Melbourne Works took place on April 4, that the author decided to employ welding in the sheet jointing. The collapse of this holder showed that the riveted joint was lamentably lacking in strength; and a short description may be of interest here.

The holder was contained in a brick tank 200 ft. in diameter by 36 ft. deep, and was of three lifts—the inner 191 ft. 6 in., the middle 194 ft. 6 in., and outer 197 ft. 6 in. diameter each by 35 ft. deep. The original structure was erected in 1890 to the ordinary design of the period, with lattice vertical stays in the inner lift as main members, and curved plates as secondary members, which had collapsed through corrosion and wear when the destruction took place. Bent plates formed the cups and dips; the inner and middle lift vertical stays being channel sections. Radial rollers only were provided. At the time of its collapse, the holder was about 80 ft. high—*i.e.*, the third lift was just out of water—when the crown lifted off bodily, allowing the enclosed gas to ascend into the air in a solid ball, which caught fire, either from a neighbouring stack or from a spark caused by the rending metal on the rapid descent of the structure. The heat was terrific, and everything in the vicinity was either scorched or burnt; but fortunately no great damage was done except to the gasholder. The clearing of the wreckage occupied considerable time, as it was necessary to take every precaution to ascertain the real cause of the collapse; and it was not until 1921 that a commencement of the reconstruction was possible. The new gasholder was redesigned; and it embraced many novel features.

Description of New Gasholder.

It will be realized that, as no sheets were being rolled in Australia at that time, some delay occurred in obtaining material; but the sections employed were generally of Australian manufacture being rolled at the Broken Hill Works at Port Waratah, Newcastle (N.S.W.). A completely new design for the holder was taken in hand by the drawing office staff of the Company; and, as the different sections were completed, they were put in hand in the Company's construction shops, thus enabling the fabrication of the structure to proceed without delay. A new timber framing of improved design was installed, as well as new tank guides.

The general dimensions of the new holder are as follows:

Cups and dips are composed of 12 in. by 4 in. channels, and the 22 vertical stays of the outer and middle lifts are composed of three channels welded together. This welding was intermittent—*i.e.*, not continuous throughout the length of the stays. The inner lift framing is particularly strongly built, as the author considers it should be, and consists of two channel iron sections braced together by double triangular bars. The curb angle is of 6 in. by 6 in. by ⅜ in., splayed to conform to the angle of the crown curb. The curb-plate and hanging plate are each of $\frac{7}{16}$ in. thickness. The vertical stays are affixed to the crown curb-plate and hanging plate at the top, and to the cup at the bottom of the lift. A re enforcing angle was placed under the crown curb-plate, and strong gusset plates, attached thereto, to the top of the vertical stays.

The crown sheets, as well as all the side sheets, are of $\frac{9}{16}$ in. thickness, and are electrically welded together by the quasi-arc process. This latter, which is believed to be entirely novel, presented many interesting features and difficulties. In the first place, the sheets, which were of the largest size procurable—viz., 8 ft. by 4 ft.—were originally welded in sets of four on the ground before erection; but this plan was early found to be inadvisable, owing to undue distortion, and the remainder were erected loose, and fastened together with bolts smaller than the holes through which they passed. Thus $\frac{3}{8}$ in. holes were used and ¼ in. bolts, to enable the sheets to move freely, and to provide against the distortion due to contraction after the welding process. It is impossible here to describe in detail the many difficulties met with, and the many disappointments, which at times were sufficient to dishearten the staff. It was only by the most careful attention and experiment that all difficulties were at last overcome; and the finished sheeting appeared as flat and perfect as any engineer could wish such a structure to be. Carriages were furnished at the top and bottom of each vertical stay; the adjustments of these being completed on the inflation of the holder with air in June, 1922.

There are 15 miles of welding in this structure; and there were not more than six leaks when tested. During the building of the holder, continuous tests were being made with various joints; and these are still being carried out, in order that the welders themselves, and the designing staffs, may become familiar with the best types of joints, and the best methods.

A Holder at Fitzroy.

The building of the Fitzroy holder was commenced on the completion of the South Melbourne structure; and, as such pronounced success had rewarded our efforts in face of unparalleled difficulties, the author determined to carry out the problem of construction further by constructing this holder exclusively by electric welding. The holder originally erected here was contained in a brick tank 163 ft. in diameter by 25 ft. in depth and was of 500,000 c.ft. capacity. Shortly after the author's arrival in Melbourne, it was found to be in such bad order, and so leaky, that it was put out of action. But the work of construction was delayed owing to more essential gasholder work being pressing. The design of the new holder provided for a structure of two and three-eighths million c.ft. capacity, of four lifts, each 35 ft. in depth. The original tank was cut out of basalt subsoil, and the dumpling was unfaced; the result being that disintegration had supervened, and great boulders had fallen into the tank bottom. The base of the dumpling was cut back to accommodate the four lifts, and it was faced with 12 in. of concrete to prevent further disintegration. The tank wall was raised 10 ft. 6 in. by the erection of a reinforced concrete extension 9 in. thick at the top and 12 in. at the bottom, extending behind the top of the tank wall as an apron to counteract the additional pressure of the water exerted on the wall. This was specially necessary, owing to the street surrounding the yard being some 7 ft. lower.

Novel Design of Extension Wall.

The design of this extension wall is novel, and has proved in this and another similar case entirely satisfactory. The sixteen guide standards, with their horizontal members, are all latticed structures, entirely welded-up. The standards are formed of two heavy steel channels 10 in. by 3½ in. and diagonally braced with angle irons. The horizontal struts are composed of four angle irons, to which were welded angle iron diagonal bracing, thus forming box girders. These members, with the diagonal ties, were all welded-up. The ties of the lowest bay were screw-adjusted before the second bay was welded-up, and so on. At the top of the structure, which is of five bays, wind tie brackets extend radially inward, and are connected with bar ties fitted with adjustable turnbuckles. All the various members of the guide framing were completely welded-up in the workshop before assembling on the site, to secure a minimum use of service bolts in the field. The four lifts and the crown are constructed in a manner similar to that of the new South Melbourne holder just described. Here, however, the experience gained on the former holder greatly facilitated the erection. The total weight of the steel in this holder is about 760 tons; and in sixteen weeks twenty men, eight of whom were welders, completed the erection. The Fitzroy gasholder was subjected to rigorous examination, and proved to be, if anything, a more effective piece of construction than the South Melbourne holder. Not a sign of a leak was anywhere discerned.

THE "FULPRUFE" MULTIPLE COIN EXCHANGE MACHINE FOR ALL TYPES OF PREPAYMENT METERS.

The first purpose of the introduction on the market of the "Fulprufe" multiple coin exchange machine is to eliminate the annoyance experienced by users of prepayment gas-meters, who often find themselves without a penny piece, and unable to obtain light or heat. Few gas consumers who have prepayment meters have not become enraged at the thought of dozens of pennies inside the meter, when the light is rapidly fading away, and there is neither a penny in the house nor even a person from whom to borrow one. This new machine makes it possible to recover these copper coins in exchange for silver.

THE "FULPRUFE" MACHINE DESCRIBED.

The "Fulprufe" machine is merely an attachment to the prepayment meter, and works on a simple principle. As will be seen from the illustration, it is directly below the prepayment attachment, and consists of slots for the insertion of silver, a handle to turn, and an aperture from which to take the change. It is absolutely fool-proof, cannot get out of order, and never miscalculates. The model illustrated here is designed to deliver coppers in exchange for shillings and sixpences; but on the same principles machines can be made for the use of any other coins.

For the coins first mentioned, there are two slots of the necessary size to receive them. Place a sixpence in its slot, turn the handle, and six pennies are delivered as fast as the handle is rotated. The machine counts. You simply turn the handle; and when six coppers have been ejected, the handle will turn no more. You cannot put a shilling in the sixpenny slot; and if a sixpence is placed in the shilling slot, it is instantly returned to prove your mistake.

TRAGEDY AVERTED.

The machine is ready for other emergencies, too. Let us suppose that the household has run out of coppers the day after the meter has been emptied, and no more than one penny has been put in the prepayment meter. One member of the household inserts sixpence, and gets but one penny, when the handle will turn no more. Everything is all right for the moment—the penny is put into the meter, and up goes the gas. After the pennyworth of gas has been used, another member of the household, finding the gas going down, wishes to put a penny in the meter. The second member has not got the necessary coin either, and prepares to seek change for silver, but finds it cannot be inserted in either slot because a slide covers both; the "Fulprufe" machine will accept no more silver until it has given value in copper for the higher coin already received. All is not lost, however. When the first member of the household received a penny from the exchange, it was put into the meter, and if the second member turns the exchange handle the penny will be returned. This is put into the meter once more, and up goes the light. Assuming that pennies are still not available without recourse to the exchange, this method can go on until six pennies have passed out of the exchange and six-pennyworth of gas has been burnt.

This is an unlikely case, of course; but it illustrates the thoroughness of the machine, and the care taken to guard against the "overpaying" of the meter for gas supplied.

ATTACHMENT TO PREPAYMENT METERS IN USE.

The "Fulprufe" machine is compact and neat in appearance, and can in the course of a few minutes be attached to prepayment meters in use. No soldering is required for attachment, and yet all securing parts are hidden within the meter, and safeguarded from tampering. The machine is designed to withstand hard treatment; and judging by the long and severe tests that have been applied, it is guaranteed many years of wear.

The benefit of the "Fulprufe" multiple coin exchange machine to the gas consumer is great; but the gas companies must gain considerable advantage also. When it is remembered that five pounds of silver bulks and weighs about the same as five shillings worth of coppers—or about one-twentieth part—the point is obvious.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Annual Meeting.

The 21st Annual General Meeting of the Association took place on Saturday, in the Lecture Room of the Fuel Department at Leeds University. Mr. H. L. BATEMAN (the President) occupied the chair, and there was a large attendance of members. As visitors there were also present Mr. W. B. M'Lusky (Engineer and General Manager to the Halifax Corporation Gas Department), who subsequently gave an address to the meeting; Prof. J. W. Cobb (Head of the Fuel Department at the University), Mr. Hodsman and Mr. J. W. Wood (members of his staff), Mr. J. H. Clegg (President of the Manchester District Junior Gas Association), Mr. Settle, and Mr. J. Bridge (Elland), representative of the Juniors on the Education Advisory Committee of the Institution of Gas Engineers.

ANNUAL REPORT.

The annual report, submitted by the HON. SECRETARY (Mr. F. A. C. Pykett), stated that there had been ten general meetings during the past session, and the interest on the part of the members generally had been so increased as to result in a very successful year. The membership was well maintained; the present total being 164, a net increase of 12 over the previous year. There had been 12 resignations, but 26 new members had been elected. The Council had to record, with deep regret, the death of Mr. G. Crowther, of Liversedge, and of Mr. J. A. Catlow, of Ravensthorpe. The average attendance of members during the session at all meetings and works visits was 36 p.ct.—an improvement of 2 p.ct. over last year. Hearty congratulations were extended to Messrs. E. L. Oughton, C. R. Ingham, L. F. King, J. Beverage, W. Barber, T. R. Mortimer, J. Davies, and other members who had gained promotion during the session. The Council desired, on behalf of the members generally, to express thanks to the various undertakings, engineers, and manufacturers who had given facilities for meetings and visits during the session; and gratitude was expressed to the following gas undertakings who had kindly provided travelling expenses to their staff who were members of the Association: Bradford, Wakefield, Yeadon and Guiseley, Penistone, Elland, Dewsbury, Sheffield, Blackburn, Harrogate, Hemsworth, Wombwell, Leeds, Silsden, Ossett (half), and Spenborough (half).

The statement of accounts, presented by the HON. TREASURER (Mr. C. Roper, of Bradford), and audited by Messrs. A. W. Arnold (Bradford) and A. Lister (Yeadon), showed a balance in hand of £66, as compared with £37 at the end of the previous year.

Mr. H. RHODES (Bradford), moving the adoption of the report and financial statement, said it was a matter for great satisfaction that the membership was increasing so steadily and the interest of the members also, and that there was such a handsome increase in the funds of the Association. The officers and Council were entitled to credit for the successful manner in which they had conducted affairs.

Mr. J. W. HORWILL (Halifax) seconded, and the motion was carried.

On the motion of Mr. C. ROPER, it was unanimously decided to reduce the rate of subscription to the Association to 10s. for ordinary members and 7s. 6d. for members under 21 years of age. Mr. Roper said it had been generally agreed by the Joint Council of the Junior Associations that there should be this reduction as soon as was practicable, subject to approval by the Associations themselves. At the same time, members need not think there was no particular hurry for their new subscriptions because there was a good balance in hand. This good balance included money which had to be paid out for copies of the "Transactions" which members already had in their possession.

NEW OFFICERS.

The election of officers for the year 1923-4 resulted as follows:

President.—Mr. W. Heathcote (Halifax).
Junior Vice-President.—Mr. R. N. Webb (Leeds).
Hon. Treasurer.—Mr. H. Wilde (Bradford).
Hon. Secretary.—Mr. F. A. C. Pykett (Halifax).
Assistant Hon. Secretary.—Mr. F. Firth (Leeds).
Additional Members of Council.—Messrs. P M'Nab (Low Moor) and G. C. Bradbury (Brighouse).

Mr. BATEMAN, in introducing Mr. Heathcote as his successor in the Presidency, said Mr. Heathcote was well known to all the members—better known, indeed, than many a man who had been in the Association longer than the five years or so during which

Mr. Heathcote had been a member. He was a man they all greatly esteemed, and who would make a fine President. Mr. Heathcote was very enthusiastic, and would fully maintain the traditions of the Association.

Mr. Heathcote (who was very cordially received) said he appreciated the great honour done him by his election. The dignity of the Chair had been upheld by many excellent Past-Presidents, whose precept and example he would try to follow worthily. He wished to extend a very hearty welcome to the visitors among them that afternoon. They all greatly appreciated the interest demonstrated by gentlemen of very little leisure, who devoted a Saturday afternoon to one of the Juniors' meetings. It was a great encouragement to the Juniors themselves, and had a considerable influence in maintaining the enthusiasm which brought success to the Association.

Mr. A. W. Arnold (Bradford) proposed a vote of thanks to the retiring officers.

Mr. C. D. Cawthra (Halifax), seconding, said he thought they had been particularly fortunate in the selection of officers.

Mr. H. L. Bateman responded.

Cheaper Gas and Greater Consumption.

Mr. W. B. M'Lusky, of Halifax, then delivered an address on the subject of producing cheaper gas as a means of increasing consumption.

The address, and the discussion thereon, are held over to next week's issue, owing to the desirability of including a chart which Mr. M'Lusky used but which has to be prepared in stronger outline for purposes of publication.

At the conclusion of the meeting the members and visitors adjourned to the Victory Hotel, Leeds, for high tea, and in the evening an enjoyable smoking concert was held, in the course of which toasts were given to "Kindred Associations" (by Mr. R. N. Webb, Leeds), responded to by Mr. J. H. Clegg, who spoke of the value of joint gatherings and interchange of visits between the Associations; to "The Visitors" (by Mr. S. H. Packer, Bradford), responded to by Mr. M'Lusky and Mr. Bridge; and to "The New President" (by Mr. H. L. Bateman, of Wakefield), given with musical honours, and responded to by Mr. Heathcote.

Water Gas and Oxygen.

Detailed information has been compiled by Mr. F. W. Davis, and is obtainable from the United States Bureau of Mines, at Washington, with regard to possibilities in the application of oxygen to the manufacture of water gas, which subject has recently been reported upon to the Department of the Interior by a Committee appointed by the Bureau of Mines. It is stated that straight water gas made with atmospheric air has a heating value of less than 300 B.Th.U. per c.ft., while gas made in the same manner, but substituting oxygen for air, would have a heating value of about 400 B.Th.U. With a 400 B.Th.U. gas available, it would probably be much easier to induce municipalities to eliminate existing illuminating power standards than has been found possible heretofore with straight water gas—particularly as this moderate-value gas could be produced at a very attractive figure. It is, says the "American Gas Journal," the opinion of the Bureau of Mines Committee that a gas of 400 B.Th.U. could be used for town supplies without any further enrichment. It is the feeling of the Committee that experimental work upon this line should be started as soon as possible.

Back-Run Gas.

In a paper presented at the recent meeting of the Michigan Gas Association, Mr. W. W. Klyce explained that so-called "back-run gas" is made in an ordinary water-gas set so modified that steam is introduced into the gas off-take at the superheater, passing back through the superheater and carburettor in a superheated condition to the generator, where, combining with carbon, it forms blue gas; the blue gas being then conducted to the wash box, and thence to the relief holder. A back-run pipeline, of approximately the same size as the connections between the superheater and wash box, is run from the generator ashpit to the inlet of the wash box; and a valve is placed in this back-run pipeline. A butterfly valve is also inserted in the gas off-take from the superheater between the superheater and the back-run connection at the wash box inlet. The operation consists of three cycles—blow, up run, and back run. All oil is introduced on the up run, in the usual manner. The back-run cycle is started as soon as the oil is cut off and the machine is clear of oil gas; and the back-run time is approximately 50 p.ct. of the total run period. The original idea of passing steam back through the superheater and carburettor was to keep the chequer brick free from carbon, thus enabling the gas industry to use heavier oils, and also oils with a higher sulphur content. It was also the desire of the designer to use soft coal as a water-gas fuel; the coal in this back-run process being introduced continuously into the generator during the back run. The coal being introduced into the generator in the presence of superheated steam, &c., would be partially carbonized before coming to rest on the fuel bed. At the present time, the chequer bricks are entirely free from carbon. While the process had only been in use at Pontiac about eight months, it apparently had been doing more than was originally expected of it.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

An Alloa Scandal.

Sir,—The attention of the Town Council has been directed to an article under the above heading which appeared in the issue of the "Gas Journal" of the 26th ult., and which was reprinted in the "Alloa Journal" of the 6th inst.

A local authority entrusted with the administration of public affairs should be prepared for fair and intelligent criticism of its mangement. There generally will be room for difference of opinion as to the wisdom or otherwise of the line of policy pursued in particular circumstances; and fair and honest criticism should be welcomed. But anyone who ventures to assume the role of critic should take care that he is well informed upon all essential facts; and this, while true of any individual, is doubly necessary when the criticism finds a place in the editorial columns of a responsible journal.

You, Sir, have very evidently been furnished from this locality with certain facts and figures, upon the fullness and accuracy of which you have relied in writing, or accepting responsibility for, the article dealing with Alloa's Gas and Electricity Undertakings; and you will doubtless be sorry to learn that these facts and figures are neither full nor accurate.

May I, at the outset, point out that both the gas and electricity undertakings are within the jurisdiction of the Town Council, and under the charge of the same Committee. So far, however, as the Town Council is concerned, the undertakings are not now, and never have been or should never have been, regarded as "competing concerns." As a matter of fact, they were both, until a few years ago, under the charge of one individual as Manager—viz., Mr. J. W. Napier, who is the present Manager of the gas undertaking. The aim of the Town Council has always been to provide within their district the very best conditions for the supply of both gas and electricity for any and every purpose to which these valuable agents can be applied in the industrial and domestic life of the community.

The point to which the attention of members of the Town Council has been specially directed is your very definite and dogmatic statement contained in the following sentences:

> "Such a burden as approximately £40,000 could not have arisen by any other means than inefficient administration by the local governing body of the affairs of the electricity undertaking. It is all very well to say that depression of trade has caused this and that to happen. Depression of trade has a common incidence upon undertakings supplying the needs of industry; it does not select one concern more than another to be the victim of its repressive action."

May we be permitted to say that your statement is much too sweeping and that as matter of common knowledge it is untrue. Depression of trade does very often select one concern more than another as a special victim, and witnesses to the truth of this can be obtained from well nigh any district. In Alloa, the chief victim was shipbuilding, and, through the failure of shipbuilding, the electricity undertaking of the Alloa Town Council. The effect upon the undertaking as the result of the slump in shipbuilding has created conditions affecting the workers in that industry and this whole community which are not equalled by any of the other industries carried on within the burgh. During the war period, shipbuilding, which for some years prior thereto had been carried on upon a comparatively small scale, was tremendously extended by a Company who appeared to be possessed of very ample financial resources. Yards were acquired; and one at enormous expense was formed and equipped. Probably something not far short of a million pounds were expended in plant and buildings, and thousands of men were engaged turning out vessels of various sizes up to 13,000 tons, or thereby. The yards are now silent; one has been dismantled, and the others are in the market. It was regarded by the Government as an industry of first-class importance; and the resources of the Corporation in the supply of electricity were hopelessly unequal to the strain laid upon them. In these circumstances authority was asked from the Scottish Office for additional borrowing powers to enable the Corporation to instal new plant; but the Ministry of Munitions, to whom the request was referred, declined to recommend the grant, and demanded that the Corporation should make arrangements for supply from a power company operating upon their borders. It would probably have been wiser had the Town Council acquiesced in this demand, but they were advised and strongly urged by their late Manager (Mr. J. W. Napier) to insist upon new plant being installed; and their persistent efforts were at the time so successful that not only the proposed loan, but an amount six times larger, was authorized upon the advice of the electricity experts of the Government. At this stage, and again upon the advice of their Manager, it was resolved that steam plant should be acquired, and used in conjunction with the existing gas-engines. There were heavy commitments for the purchase and erection of steam plant; and, unhappily, very shortly thereafter the shipbuilding industry came to a dead stop, and the new plant was rendered largely unproductive. These are the broad facts; and it will be seen that the present financial position of the Electricity Department is very largely—indeed, almost wholly—bound up with, and explained by, the position of the shipbuilding industry, and is not the result of mismanagement or inefficient administration.

There remains for remark what you, Sir, describe as "the absurdity of making an undertaking pay the losses of its competitors." As has been said, the two concerns in question are not in reality, and should never in any quarter have been, regarded as rivals in business. But even if they had been so, what in the present circumstances is the remedy of the Town Council? The money to meet the adverse balance upon the electricity account must be found. Whence? The answer is to be found in the article under review. "The Electric Lighting (Scotland) Act of 1892 provides for gas profits being appropriated to satisfy deficits on an electricity undertaking." This is true, and it is equally true to say that neither this nor any other Statute provides any other

method of liquidating such a debt. Moreover, it is not only in the current year, as one would almost infer from the terms of your article, that in Alloa recourse has had to be made upon the gas revenues to meet deficits arising upon the electricity account. Over and over again in the past twenty years, and, of course, under the management of Mr. Napier, the present Gas Manager, has this had to be done, and so recently as five years ago was this the case. Whether this statutory provision is "inequitable and unjust," and ought to be repealed, is beside the point. The law was not made by the Town Council of Alloa, nor have they power to provide a way of escape for gas consumers from the consequences, even if it be conceded that "it is a wrong principle in local government to put a super-tax on one section of the ratepayers to defray the losses which should be equally distributed among the ratepayers." In the circumstances in which the Town Council are placed, it is extremely fortunate that the Burgh Commissioners of a past generation had the wisdom to acquire, under "The Burghs Gas Supply Act, 1876," a private gas undertaking which was then operating in Alloa, and, under a succession of able managers, to foster and encourage the development of gas supply. The undertaking has been successful; and there is to-day for gas consumers in Alloa a full and cheap supply which will compare favourably in point of cost with that of any municipality of anything like equal size in England or Scotland, even after the addition of 7d. per 1000 c.ft. to meet the electricity burden.

W. M. DUNCANSON,
Interim Convener Alloa Corporation Gas and Electricity Departments.
JAS. CUTHBERT, Clerk.

Town Clerk's Office, Alloa,
Oct. 12, 1923.

REGISTER OF PATENTS.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Oct. 17.]

Nos. 24,939 to 25,602.

AKT.-GES. BROWN, BOVERI, ET CIE.—"Pipe joints." No. 25,156.
BALDWINS, LTD.—"Gas engine tanks." No. 25,017.
BURGESS, E.—"Gas-lamp shades." No. 25 430.
CARTY, M. W.—"Apparatus for extraction of particles from gas streams." Nos. 25,363, 25,364.
CASSIDY, G. A.—"Gas-taps." No. 24,965.
COKE, B. E.—"Hydrogenation of naphthalene." No. 25 312.
ENDERT, D. C.—"Ejector for gas and air." No. 25 227.
FOX, T.—"Pressure governors for gases." No. 25,532.
GREENER, W. O. S.—"Valves for preventing flow of fluids in one direction." No. 24,945.
HEADLEY, F. H.—"Incandescent mantle holders." No. 24,950.
INKLEY, B.—"Mechanisms for controlling flow of fluid." No. 25,318.
JOHN, A. E.—See Inkley, B. No. 25,318.
MAHON, J.—See Cassidy, G. A. No. 24 965.
MAXTED, E. B.—See Coke, B. E. No. 25,312.
MULDER, J.—See Endert, D. C. No. 25 227.
PINET, A. F. P.—"Manufacture of illuminating gas" No. 25,374.
RADIATION, LTD —"Gas-heated cooking apparatus." No. 25,150.
ROBINSON, S.—See Fox, T. No. 25,532.
SANGSTER, J. S —See Baldwins, Ltd. No 25,017.
SMITH, H. G.—See Burgess, E. No. 25 430.
SYNDICATE MULDER-ENDERT.—See Endert, D. C. No. 25,227.
TIBBITS, J. C.—See Greener, W. O. S. No. 24,945.
TOOTH, L. F.—"Muffle furnaces." No. 25,062.
WRIGHT, N.—"Gas illuminating apparatus." No. 25,402.
YATES, H. J.—See Radiation, Ltd. No. 25,150.

Price Reduction at Falkirk.

Treasurer Anderson, in his "budget speech" to the Falkirk Town Council, said the revenue-producing undertakings had been very successful during the past financial year. Twelve months ago, reductions in the price of gas were made of 1s. per 1000 c.ft. to domestic consumers and 1s. 3d. to power users. Notwithstanding these reductions, the working of the past year had enabled the Council to transfer the sum of £19,300 towards the reduction of the expenditure on the Glover-West vertical retorts. These cost £65,661; and though only two years in commission, the balance outstanding thereon had already been reduced to £30,921. The decision of the Council to instal the retorts had been fully justified, in view of the past reduction in price and the wiping out of such a large proportion of the debt on the retorts, with consequent saving of interest charges, &c. It was estimated that in five years the cost of the vertical retorts will have been completely cleared off. The estimates for the current year were also extremely satisfactory; and it was proposed still further to reduce the price of gas to consumers. For domestic purposes the prepayment meter rate would be reduced from 4s. 11d. to 4s. 3d. per 1000 c.ft., and the ordinary meter rate from 4s. 9d. to 4s. 1d.—a reduction of 8d. per 1000 c.ft. in each case. For power, industrial, and other purposes, the charges would be reduced from 4s. to 3s. 6d. per 1000 c.ft.; while, in addition, large consumers were entitled to substantial discounts. It was also estimated that there would be a further sum of £6500 available this year for reduction of the outstanding balance on the vertical retorts account. In 1917-18, when coal was at an average price of 20s. 10d. per ton, the prices of gas were from 3s. 7d. to 4s. 4d. per 1000 c.ft. This year's prices were under these figures, though coal was now costing 23s. 8d. per ton. When the vertical retorts were first spoken of, they talked of getting 19,000 c.ft. of gas per ton of coal; and a few of them were doubtful that such a figure could be reached. This year they were actually obtaining 19,180 c.ft. per ton, and were estimating to get 19,200 c.ft. This, he thought, was very satisfactory, as showing the justification for the installation of the retorts.

LEGAL INTELLIGENCE.

DAMAGE TO GAS-MAINS BY THE USE OF ROLLERS.

The action of *The Aldershot Urban District Council v. The Aldershot Gas, Water, and District Lighting Company* came before Mr. Justice BAILHACHE in the King's Bench Division of the High Court on Tuesday, Oct. 16; plaintiffs seeking to recover the cost of work and labour done, and material supplied at defendants' request. By counterclaim, defendants sought an injunction to prevent damage to their pipes.

Mr. MONTGOMERY, K.C., and Mr. A. A. BETHUNE appeared for the plaintiffs; Mr. HUGO YOUNG, K.C., Mr. LE BRETON, K.C., and Mr. WILLOUGHBY WILLIAMS, for the defendants.

Mr. MONTGOMERY said this was a claim by a local authority to recover the cost of reinstatement of trenches opened by defendants in the course of their work. Defendants had the right to break-up streets, but were under liability to reinstate the streets and to keep them in repair for twelve months. The practice in Aldershot had been that the plaintiffs, by arrangement with the defendants, carried out the repairs of the trenches at once; but no arrangement of the work was necessary unless the defendants reinstated the roads. There were a number of details with regard to the claim; but the parties were desirous to get the question of principle decided. The action was to recover the cost of reinstating trenches which had been opened by the defendants, and the defences were nominally four: (1) A denial of any request on the part of defendants to have the work done, (2) that the work was unnecessary, (3) a denial of refusal to pay, and (4) that the prices charged were excessive.

Mr. YOUNG said he did not rely on the third point.

Mr. MONTGOMERY stated that plaintiffs claimed that when a trench was opened they were entitled to make the road as strong and efficient as it was before; while defendants' contention was that plaintiffs were only entitled to put back the material which came out of the trench, and to ram it down.

Mr. YOUNG remarked that, apart from the question of principle, defendants contended that the charges were not accurate and proper for the work which had been done.

His LORDSHIP intimated that he did not intend to decide the question of price.

Mr. MONTGOMERY said that with regard to the point that the work was done without request, there was undoubtedly an arrangement beginning in 1918 that the defendants, after sending notice of intention to open the trench, should send another notice that the trench was ready for the purpose of reinstatement. This arrangement went on for a considerable period, and payment had been made under it until Dec. 30, 1920. On May 4, 1921, defendants wrote stating that they would carry out their statutory obligation, which, of course, put an end to any arrangement. Some work had been done by plaintiffs, and though the amount in dispute was small, a question of principle was involved.

Mr. YOUNG remarked that since May 12, 1922, when the action was started, the work had been going on, and further accounts were running. What defendants were anxious to have decided was the principle on which the account should be made out. After defendants had properly filled-in the trench, the plaintiffs proceeded to make a better road than existed before, by putting-in strengthening material.

Mr. MONTGOMERY contended that it was necessary to make the road as efficient as it was before.

His LORDSHIP said the question concerned the standard up to which the road should be re-made.

Mr. MONTGOMERY, while agreeing, said there was the further question as to whether there was a request by the defendants to do the work.

His LORDSHIP: Why do not the defendants fill-in the trenches themselves?

Mr. MONTGOMERY: They have always done so.

His LORDSHIP: Then why should they request you to do it?

Mr. MONTGOMERY: They did not profess to reinstate the road, though they always filled-in the trench.

His LORDSHIP: I do not think the question of request is material, because if defendants had not made-up the road, plaintiffs were entitled to do it either with or without request.

Mr. YOUNG said if defendants made default under the Gas-Works Clauses Act, 1847, the plaintiffs had the right to recover the expense in a Court of Summary Jurisdiction, but not in the present action. Though the technical defence had been raised, the defendants had paid into Court a sum which they considered sufficient to meet the proper cost of repair.

Mr. MONTGOMERY stated that the defendants, by counterclaim, sought to recover damages alleged to have been done to the gas or water pipes by the use of steam rollers of excessive weight; and this raised a very important question as to whether the pipes were laid at a sufficient depth. The duty of the local authority was to repair the roads and to bring them up to all modern requirements; and they must take whatever steps were necessary for this purpose. The defendants were really challenging this, and alleging that the rollers were of excessive weight; but the heaviest roller was of the type and weight used throughout the country. The case was really covered by the decision of the Divisional Court in *The Commercial Gas Company v. Poplar Borough Council*.

Mr. YOUNG remarked that that case was brought under the Metropolis Management Act of 1855, and not under the Gas-Works Clauses Act of 1847, and therefore had no application. By the 1847 Act defendants were empowered to break-open roads, and with all convenient speed to fill-in trenches and reinstate and make good the road, and keep it in repair for a certain period. That contemplated not the immediate making good of the road, but the allowance of a certain time for the road to subside. Section 34 provided that, if defendants neglected to do the work, the plaintiffs might do it and recover the cost by summary proceedings. Instead of reinstating the roads in accordance with the

Act of 1847, plaintiffs had proceeded to reconstruct them by putting-in a quantity of hard core and covering the surface with tarmac.

His Lordship: I should say they are not entitled to do this.

Mr. Montgomery: We only claim the right to make the road as efficient as it was before.

Mr. Young, in support of the counterclaim, submitted that, having laid the pipes at a sufficient depth having regard to the traffic at the time, the local authority were bound to repair the roads in such a way as not to damage the pipes. This had been clearly settled by the decision in the case of *The Gas Light and Coke Company v. St. Mary Abbott's, Kensington*.

Mr. *A. V. Barraclough* (Engineer of the Gas Company) was called, and said the Company supplied a very large area. The subsoil in the district was of a sandy character. Some of the pipes were laid over fifty years ago, and at different depths, according to their size. Up to the introduction of steam rollers the depth was sufficient to meet the ordinary traffic; and the depth at which the pipes were laid was in accordance with plans approved by the local authority. No complaint was made until plaintiffs began to reconstruct the roads. The mains which were laid at a depth of 3 ft. 6 in. had not suffered, but some at 2 ft., and also those at 1 ft. 9 in., had been affected. These pipes had been laid for many years. As many as 30 or 40 service pipes had been broken by the steam roller.

In cross-examination, it was stated by witness that he had no plans showing when the mains in Grosvenor Road were laid, but he should say that they were laid some thirty years ago. Two of them were at a depth of 1 ft. 1 in. The pipes were in good condition. The service pipes were taken off at the top of the main with a bend, and most of them were laid at the same time as the main.

In re-examination, witness said, however near the surface, he had never known breakages occur through the ordinary traffic. When Grosvenor Road was re-made, many of the mains were exposed, and great damage was caused by the use of the heavy roller.

Mr. *Claud Allen*, who had been in the employ of the Gas Company since 1895 as chief fitter, said Grosvenor Road was a main road over which heavy traffic passed. No alteration had been made in the service pipes in this road since 1895. He believed the pipes were laid long before that date.

Mr. *W. H. Cox*, who was appointed District Inspector of the Gas Company in 1920, said that after he took charge he had no trouble with the gas-mains until Grosvenor Road was reconstructed in 1922, though he had had some trouble with the water mains. The top, or hard crust, of the road was removed to a depth of 9 or 10 in., and filled-in with clinkers, which were rolled-in by a 6-ton twin roller. Two breakages occurred. Afterwards hard core was put over the clinkers and rolled with a heavier roller, which damaged several pipes.

Mr. *Edgar Hooley*, County Surveyor of Nottinghamshire, said that, in his opinion, when Grosvenor Road was re-made the pipes near the surface should have been protected with a covering of concrete.

This was the case for defendants; and evidence was then called on behalf of plaintiffs.

Mr. *A. E. Collins*, Civil Engineer, having had many years' experience in making highways in different parts of the country, said that a heavy roller was absolutely essential in the construction of roads. The roller used in this case was of the common type—viz., a 10-ton roller. He should not consider pipes laid twenty or thirty years ago were sufficiently covered by being laid at so shallow a depth as they were here stated to be. If the pipes had stood the ordinary traffic for so many years without any serious breakages, he should consider them sufficiently protected. If breakages occurred immediately after the use of the heavy roller on the newly constructed road, he must admit the damage was caused by the roller. Steps should have been taken to protect the pipes.

Counsel having addressed the Court,

His Lordship proceeded to deliver judgment. He said that with regard to the claim of plaintiffs to recover the cost of making-up the excavations, it had been agreed that this matter should be referred to the Official Referee to settle the amount due. Defendants had paid a certain amount into Court, and it might be that they had paid all that was due. There only remained the counterclaim to deal with. It appeared that the Borough of Aldershot were considerably engaged in re-making some of the roads to bring them up to the standard required by the exigencies of modern traffic, and, in the course of doing this work, pipes had been broken. The Gas Company asked that the pipes which had been broken should be paid for, and that in future their pipes should be protected from damage. As he understood the law, it was clear that where a gas or water company laid their mains at such a depth, and in such a way, that at the time they were laid they were sufficiently and properly laid to stand the traffic which in ordinary circumstances passed over the road, then the Company were within their rights in laying their mains in that way; and if damage was afterwards done by the urban authority in repairing the roads, the damage must be paid for. In Grosvenor Road the pipes were laid at a depth which was much shallower than that at which pipes were laid now, some of the pipes being about a foot below the surface; but these service pipes had stood the wear and tear of some thirty years. It was idle in these circumstances to contend that they were not laid at a depth sufficient to stand the traffic. Therefore he could not say that the Gas Company were wrong in laying their pipes at this depth. It appeared that the Borough Council stripped the surface of Grosvenor Road to a depth of several inches, and proceeded to make-up the road; and in the course of so doing they used the ordinary steam roller. In making-up the road, clinkers and hard core, as usual, were used, but, unfortunately, the Council paid no regard at all to the Gas Company's pipes, and gave them no protection by concrete. The Council might also have given notice under section 153 of the Public Health Act, and had the pipes lowered. They did neither the one nor the other, and the inevitable result of using the heavy roller was to break the pipes. For the damage so caused they must pay. He understood that at one time the plaintiffs were willing to undertake to pay for the damage, but as a different attitude was later on taken up, he should grant an injunction against the Urban District Council from so repairing roads, and using rollers, as to cause damage to the Gas Company's pipes, without either giving notice under section 153 to have the depth of the pipes increased or without giving the pipes adequate protection. As to the damage occasioned, he thought that, as the Urban District Council had with their eyes open caused it, it was only just that the defendant Company who had suffered should have a right to come to the Court for damages; and he awarded them the nominal sum of £15. The result was that there would be judgment for the plaintiffs on the claim, and judgment for the defendants on the counterclaim for £15 by way of damages, with an injunction to prevent the repetition of damage by the Council in repairing their roads, and defendants would also have the costs of the counterclaim. The costs of the claim would depend on the result of the reference.

It was arranged that if plaintiffs were prepared to give an undertaking to pay for damage done to any existing pipes, the undertaking would be accepted in lieu of the injunction.

On the 19th inst. the case was again mentioned in the Court.

Mr. Montgomery stated that plaintiffs were prepared to give the undertaking upon the condition that they were allowed to take the £35 out of Court, and that there should be no judgment on the claim or counterclaim, and no costs. This would put an end to the action, and save the expense of a reference.

Mr. Young said he was prepared to accept the undertaking, and was willing that the plaintiffs should take the £35 out of Court and that each party should pay its own costs of the claim; but as defendants had succeeded on the counterclaim, he could not accept the offer of no costs. There was a Board meeting of the Gas Company that day, and the offer would be put before the Directors, who might accept it or not; but he should certainly advise them not to do so.

His Lordship said he did not mind the matter going before the Board. If the parties did not agree, the order already made would be drawn up.

It should be noted that the terms of judgment in this case have not yet been definitely settled, but will be reported later.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Borough of Burton-upon-Trent.

The maximum prices now authorized in respect of the supply of gas by the undertakers are: (1) In respect of the Borough of Burton-upon-Trent, 4s. 6d. per 1000 c.ft.; (2) in respect of so much of the area of supply authorized by the Town of Burton-upon-Trent Act, 1853, as is not within the borough, and in respect of the area added by the Burton-upon-Trent Improvement Act, 1878, 5s. 4d. per 1000 c.ft.; (3) in respect of the Township of Barton-under-Needwood, the Parish of Dunstall, and the part of the Parish of Branstone added to the area of supply by the Burton-upon-Trent Order, 1911, 6s. 2d. per 1000 c.ft.; (4) in respect of the part of the Parish of Rolleston added to the area of supply by the Burton-upon-Trent Order, 1913, 6s. per 1000 c.ft.; (5) in respect of the part of the township of Hatton and the part of the Parish of Tutbury added to the area of supply by the Burton-upon-Trent Order, 1913, 5s. 6d. per 1000 c.ft.; (6) in respect of the part of the Township of Stretton added to the area of supply by the Burton-upon-Trent Order, 1913, 5s. 4d. per 1000 c.ft.; (7) in respect of the part of the Parish of Newton Solney added to the area of supply by the Burton-upon-Trent Corporation Gas Order, 1923, 5s. 6d. per 1000 c.ft.; and (8) in respect of the Parish of Repton, 6s. 6d. per 1000 c.ft. The maximum prices proposed by the undertakers in substitution for those prices respectively are: (1) 1s. 2d. per therm; (2) 1s. 4d. per therm; (3) 1s. 6d. per therm; (4) 1s. 5d. per therm; (5) 1s. 5d. per therm; (6) 1s. 4d. per therm; (7) 1s. 5d. per therm; and (8) 1s. 7d. per therm.

New Mills Urban District Council.

The maximum price now authorized by section 43 of the New Mills Urban District Council Act, 1926, in respect of gas supplied in the district of New Mills is 4s 6d. per 1000 c.ft. The undertakers are authorized by Article 1 (2) of the New Mills Order, 1912, to charge for gas supplied in Disley not more than 7d. per 1000 c.ft. in excess of the said maximum price; but this sum is subject to reduction to 5d., 3d., and 1d. per 1000 c.ft. in the circumstances related in that Article. The maximum price and the differential prices per therm proposed by the undertakers in substitution for the above-named prices respectively are 15d., 1·4d., 1d., 0·6d, and 0·2d.

The additional price now authorized by section 50 of the New Mills Urban District Council Act, 1906, in respect of gas supplied through prepayment meters is 1s. per 1000 c.ft. The additional price per therm proposed to be charged by the undertakers in substitution for the above-named additional price is 3·6d. per therm.

Oxford Gas Light and Coke Company.

Notice is given by the Company of their intention to apply to the Board of Trade for a Special Order under section 10, to authorize them to build and maintain a bridge over the Thames; to extend the limits of supply; to raise additional capital; to use scheduled lands for gas-works purposes; to regulate the supply of gas; to establish co-partnership, &c.

GAS REGULATION ACT ORDER.

From the Director of Gas Administration we have received a copy of the following further Order made by the Board of Trade under section 1 of the Gas Regulation Act.

Cheadle Rural District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 16d. per therm.

Prepayment meter clauses are included. (Oct. 18.)

BRENTFORD GAS ORDER.

There was all the old atmosphere of a prolonged Parliamentary Committee inquiry, in Committee Room D, at the Central Hall, Westminster, on Monday, Oct. 15, when Mr. H. C. HONEY (Director of Gas Administration) sat to consider opposition to an Order sought from the Board of Trade under the Gas Regulation Act, 1920, on the application of the Brentford Gas Company. The change from the room in the Board of Trade Offices, where these inquiries in London are usually held, was made for two reasons. One was the extent of the opposition in the present case, and the other was that the Economic Conference has the call on the large room at the Board of Trade, and there was the risk that the parties might be turned out at any moment.

There were many well-known men in the gas industry present. On the one side were Mr. A. A. Johnston (Engineer and Manager of the Brentford Company), together with Mr. R J. Neville Neville (Chairman of the Company), and Mr. D. Milne Watson (a Director), in addition to Mr. W. Doig Gibb and Mr. A. F. Phillips; while the chief technical adviser on the other side was Mr. Arthur Valon. Mr. Ogilvie and Mr. Fottrell, of the National Gas Council, were also present.

The proposals of the Brentford Company are of considerable interest, especially to London, as they may be said to mark the beginnings of amalgamations of gas undertakings in the Western Area of the Metropolis, which can only have the effect of bringing down the price of gas eventually, when the economies consequent upon the absorption of small companies by large ones are brought fully into effect.

Monday, Oct. 15.

The promoters, the Brentford Gas Company, were represented by Mr. W. E. TYLDESLEY JONES, K.C., Mr. JACQUES ABADY, and Mr. ARNOLD BAKER. The following appeared in opposition: Messrs. J. Lyons & Co., Ltd., and Mr. J. Jewers, represented by Mr. A. MACMORRAN, K.C., and Mr. GLUCKSTEIN. The Urban District Councils of Brentford, Chiswick, Hanwell, Heston and Isleworth, and Twickenham, represented by Mr. W. J. JEEVES, K.C. The Barnes Urban District Council, represented by Mr. ROWAND HARKER. The Corporation of Richmond, represented by Mr. W. W. SZLUMPER. The London and North-Eastern Railway, Metropolitan Railway, and the Metropolitan and Great Central Joint Committee, represented by Mr. B. ASPINALL, K.C. The Hertfordshire County Council, represented by Sir H. COURTHOPE-MUNROE, K.C.

THE CASE FOR THE PROMOTERS.

Mr. TYLDESLEY JONES, opening the case for the promoters, said the main purpose of the Order was to amalgamate the undertakings of the Brentford, Richmond, and Harrow Gas Companies. The Brentford Company were originally incorporated in 1821 to supply the towns of Old and New Brentford, and some villages near—among them the village of Kensington. In 1858 the Company's limit of supply was extended by Parliament. At that date their capital consisted of stock of the nominal amount of £89,700, and they were given powers to raise further stock to the extent of £90,000. The dividend was limited to 7½ p.ct. upon their stock, and the price of gas to 6s. per 1000 c.ft. In 1868 another Act was passed, and in 1871, 1876, and 1881 Orders were made which varied the limits of supply, increased the capital, and introduced a sliding-scale. In 1914 an Act was passed transferring to the Brentford Company the undertakings of the Staines and Egham Gas Company and the Sunbury Gas Company. This Act also provided for conversion of stock. In 1919 another Act authorized the issue of further stock and the borrowing of more money; and in 1921 a Therm Order was obtained, under which the standard price was fixed at 17·8d. per therm, and the slide at 1s. p.ct. per half-year for every 0·2d. above or below the standard price on the 4 p.ct. "A" stock, and 1s. 3d. p.ct. per half-year for every 0·2d. above or below in the case of the 3½ p.ct. "B" stock. At present the area of supply of the Brentford Company is situate partly in the County of London, partly in Middlesex, partly in Surrey, and partly in Berkshire. In London it comprises the whole of the Metropolitan borough of Hammersmith, and parts of the boroughs of Kensington, Fulham, and Wandsworth. It includes the boroughs of Acton and Ealing, and various urban districts in Middlesex, the Barnes urban district and a small rural area in Surrey, and a small part of the Windsor rural district in Berks. The capital issued amounts to £1,781,965, and £209,792 have been received in premiums. It consists of "A" consolidated stock, 4 p.ct., £992,045; "B" consolidated stock, 3½ p.ct., £734,920; and 5 p.ct. preference stock, £55,000. The Company have unraised, under existing powers, £800,000. The loan capital consists of 4 p.ct. debenture stock of the nominal amount of £221,400, and of mortgages amounting to £530,890; the latter having been raised in recent years. The Company still have power to raise, by further borrowing or by the issue of debenture stock, £167,550.

THE HARROW AND RICHMOND COMPANIES.

The Harrow and Stanmore Company supply gas in an area comprising parts of Hertfordshire and Middlesex. Their capital consists of £21,000 5 p.ct. preference stock, and £227,190 ordinary stock entitled to a standard dividend of 5 p.ct. Premiums have been received in respect of the ordinary stock to the amount of £32,660; and the total stock unissued is £237,490. The Company have raised £53,420 of debenture stock, of which £50,920 is 4 p.ct. and £2500 is 5 p.ct. stock; and they have unexercised borrowing powers of £165,580. The standard price differs—being 17·2d. per therm in an inner area with a radius of a mile, and 0·6d. per therm higher in the outer area. As a matter of fact, the same price is charged throughout the whole district. The sliding-scale provides for an increase or reduction of dividend of 1s. 3d. p.ct. per half-year for every 0·2d. per therm above or below the standard price. The Richmond Company supply gas in the borough of Richmond, the urban district of Ham, and a small portion of the urban district of Barnes; but the latter, for the most part, is in the area of the Brentford Company. The issued capital of the Company consists of ordinary stock entitled to 5 p.ct. standard dividend, to the nominal amount of £181,337, and £25,000 of 5 p.ct. debenture stock. In respect of ordinary stock, the Company received £13,385 in premiums, and they have unissued to-day stock to the amount of £37,089; while by borrowing powers they can raise a further £28,333. There are two prices affecting the sliding-scale. The Company are entitled to pay an increased dividend of 2s. 6d. p.ct. per annum in respect of each 0·2d. reduction below a price of 14·8d. per therm, and must reduce their dividend by 2s. 6d. p.ct. per annum in respect of every increase of 0·2d. over 15·4d. per therm, so that there is a neutral zone, amounting to 0·6d. per therm. The Brentford Gas Company are at present charging in Brentford 9·8d. per therm; a reduction having been effected in the last quarter, as from September last. The Harrow and Stanmore Company are charging 11d. per therm, and the Richmond Company 12·4d. The area of the Brentford Company, said Council, drives a wedge northwards into the area of the Harrow Company (the Harrow area being north of the Brentford area), and the area of the Richmond Company, which is on the south of the Brentford area, also drives a substantial wedge into the Brentford area, so that the Richmond Company's area is surrounded on the east, west, and north by the Brentford area. Moreover, on the south of the Richmond Company's limits of supply there is the large area of Richmond Park, which, said Counsel, is not a very productive area for the supply of gas. Development is taking place along the Grand Junction Canal and the railways which run through both the southern part of the Harrow Company's area and the northern part of the Brentford Company's area. This, it is anticipated, will continue at a rapid rate; and there will also be considerable development as a result of the British Empire Exhibition, which is within the Harrow Company's present area. With regard to plant, Council said that the Brentford Company have an excess capacity of gas-making plant for their present requirements, but are short of storage capacity. Increased storage is required especially in the northern and south-eastern parts; the latter being in, or on the borders of, the County of London, and east of the Richmond Company's area. If the Brentford Company were to remain separate, they would have very speedily to provide further storage capacity, at considerable capital expenditure. On the other hand, both the Harrow and the Richmond Companies have an excess of storage capacity; and in the case of Richmond there is a slight excess in gas-making plant. In the case of Harrow, however, the demand has overtaken the capacity, and if they remain separate, they also will have to incur large capital expenditure in order to provide further plant. Therefore, said Counsel, apart from the obvious advantages and economies arising from amalgamations of this sort, there are special advantages to be gained from amalgamation in this case. The Brentford Company could make up the deficiency in the Harrow area by utilizing the excess capacity in their own gas-producing plant, and could postpone capital expenditure by making use of the storage facilities at Harrow, while Harrow could also postpone expenditure. The Brentford Company have three works—at Southall, Brentford, and Staines—all on the north of the Thames; but, the utilization of the excess storage capacity and gas-making plant at Richmond would facilitate the proper distribution of gas by the Brentford Company in the south-eastern part of their area, which is nearer to the Richmond works than to the Brentford Company's works. Counsel added that when the Brentford Company was originally incorporated, Richmond was, in fact, placed within their limits of supply, but later the Richmond Company were formed. Counsel did not mean that if the present amalgamation was carried out the Brentford Company would in the future have sufficient gas-making plant to deal with the whole area at the existing stations, because there was not the slightest doubt that in the near future further plant would have to be provided if they were to cope with the demand expected in the Brentford and Harrow areas. Therefore, the promoters sought power under this Order to make gas upon land which at present belonged to them, in the urban district of Greenford. It was the intention to erect those works when necessary to deal with the whole of the industrial district in the south of the Harrow area and the north of the Brentford area. There were other peculiar advantages which would follow amalgamation in this case. The Brentford Company had done a great deal to encourage the use of gas in their district; and the consumption per head in Brentford at present was very much higher than in Richmond or Harrow. Therefore, the Brentford Company would be able to pursue the same policy in the added areas, which, for some reason, had not been open to the Companies in those areas.

Counsel then divided the proposals of the Order into four headings. In the first place, it is proposed that the debenture stockholders of the Harrow and Richmond Companies shall be given debenture stock of the Brentford Company to produce the same income. The nominal amount will have to be increased in some cases, because the Richmond Company have a 5 p.ct. debenture stock, whereas the Brentford Company have a 4 p.ct. debenture stock only. It is also proposed that holders of preference stock in the Harrow Company shall receive a like amount of preference stock in the Brentford Company; each being 5 p.ct. The ordinary stocks are to be dealt with in different ways. It is proposed that the holders of ordinary stock in the Harrow Company shall receive, for every £100 of stock, £112 10s. of the "B" Brentford stock. The standard dividend on the Harrow ordinary stock is 5 p.ct., and that on the "B" stock of the Brentford Company 3½ p.ct.; but, owing to the lower price of gas in the Brentford Company's area, the latter Company are able to pay a considerably larger dividend than 3½ p.ct., though not so large as the Harrow Company could pay on their ordinary stock. In the case of the Richmond Company, it is proposed that the holders of ordinary stock shall receive, for every £100 of stock, £100 of 6 p.ct. debenture stock of the Brentford Company—a new debenture stock proposed to be issued, redeemable at any half-year, on six months' notice, at the price of £106. Curiously enough, said Counsel, this had been criticized by some of the opponents, though it had struck him as a very favourable arrangement, because it was a loan of a certain sum at 6 p.ct., which might be paid off at any time on six months' notice, at a premium of £6. The Brentford Company would be in a position, when opportunity offered, to redeem this debenture stock under most favourable terms, and to substitute for it a debenture stock which would receive the then rate of interest. This was criticized as being a proposal which would give

an undue advantage to the holders of the ordinary stock of the Richmond Company. On an amalgamation of this sort, ordinary shareholders tried to get a good security, and one which would provide a long-term investment; but in this case the Richmond shareholders had been willing to accept a short-term investment, which put the Brentford Company in a very favourable position. The capital which would be created under the Order for the purpose of the amalgamation was: 4 p.ct. debenture stock of the Brentford Company, amounting to £85,295, and 6 p.ct. redeemable debenture stock to the amount of £181,337; 5 p.ct. preference stock amounting to £21,000, and "B" consolidated stock amounting to £255,589. Hence, the loan capital would be increased by £266,632, and the ordinary and preference stock by £276,589, in exchange for the undertakings absorbed.

The second proposal of the Order was to repeal the existing Acts of the Harrow and Richmond Companies, with certain exceptions, and to extend to the whole area of the Brentford Company under this Order the Brentford Company's Acts, except that the price in the Richmond district shall be 1·2d. per therm higher than in the rest of the district. It was proposed, however, that this difference should be gradually reduced—this was not in the Order—by 0·2d. per annum, until the difference was entirely wiped out, and so follow a precedent which Parliament adopted in the Brentford Company's Act of 1914, when they were authorized to take over the Sunbury undertaking. The result of extending the existing Acts to the whole area, with this slight alteration in the Richmond area, will be to give to the Harrow consumers, on the present prices, an immediate reduction of 1·2d. per therm, and to the Richmond consumers one of 1·4d. per therm. The proposal to preserve a difference, though diminishing it, was responsible for the appearance of Mr. Szlumper (for the Richmond Corporation); but he hoped the reduction of 0·2d. per therm per annum would help Mr. Szlumper.

Mr. Szlumper: Every little helps; but we shall probably get a better offer later on.

Mr. Tyldesley Jones, continuing, said the third proposal was to transfer to the Brentford Company the unexercised capital powers of the Harrow and Richmond Companies, as was done in 1914, when the Brentford Company took over the Staines and Sunbury Companies, and had been done in every single railway amalgamation that had been carried out under the Railways Act of 1921 by the Railways Amalgamation Tribunal. Yet the proposal raised some opposition in this case. He pointed out that the three Companies were each given capital powers in accordance with the needs of their districts. Those districts will remain, and the demands will have to be met by capital expenditure; and the Brentford Company, when taking over the obligations of the Harrow and Richmond Companies, should take over, at the same time, the means of discharging these obligations, by raising the necessary capital. As to the effect of taking-over the unexercised capital powers of the two Companies, the Harrow Company have to-day unexercised powers to raise money by stock to the extent of £237,490, and the Richmond Company have power to raise a further sum of £37,089, making a total of £274,579 of stock. The unissued loan capital in the case of Harrow is £165,580, and in the case of Richmond £28,333, making a total of loan capital powers of £193,913. The last proposal was that of making gas on the lands of the Company at Greenford. This, however, was an entirely separate matter.

Dealing with the opposition, Counsel said it would be noticed at once that, though the Brentford Company included in their limits of supply a most important part of London, the local authority for gas purposes in London (the London County Council) were not opposing the Order. The Parliamentary Committee of the Council, after consideration of the Brentford Order, had reported that the terms of the transfer did not appear to be unreasonable. The report pointed out that provision was made to enable the Brentford Company to subscribe towards the capital of, or to lend money to, any gas company carrying on an undertaking in any district contiguous or near to the Brentford limits of supply; but the Committee advised the Council that the proposal was not one to which there were grounds for objection. After consultation with the Public Control Committee, they had decided not to take any action. Not one of the local authorities opposing the Order objected to the principle of amalgamation, nor did any of them suggest that amalgamation was not going to be a means of effecting economies. The grounds of the objection were that the terms which the Brentford Company proposed to give to the Richmond ordinary shareholders were excessive.

Mr. Szlumper remarked that this was the least part of the Richmond Corporation's opposition. The greatest point was that the Brentford Company would charge the Richmond consumers a higher price than the Brentford consumers.

Mr. Tyldesley Jones said that no objection was taken by anybody to the terms offered to the Harrow Company; and the main point of the objectors was to the consideration it was proposed to give the Richmond shareholders. It was not the amount so much as the form in which it was proposed to be given. There was also objection that the compensation it was proposed to give to the Directors of the Harrow and Richmond Companies was excessive. The proposal in the Order was to give them seven years' fees; and he could only say that this was in accordance with precedent after precedent. It was given to the Directors of the Staines and Sunbury Companies when they were absorbed by the Brentford Company in 1914; and it was the normal basis nowadays. The income-tax on these fees was also to be paid to the retiring Directors, and this was objected to; but the fees had been free of income-tax in the past. Objection was also taken to the proposal to pay three years' remuneration to the retiring Auditors as compensation; but this was the usual period. As to the differential price in Richmond, it was proposed to give a bigger reduction actually to the Richmond consumers than to the Harrow consumers. The Brentford group of local authorities and the Barnes Urban District Council had pointed out that the present was a good opportunity for the Brentford Company to revise their standard price. Counsel suggested, however, that this was not the occasion to enter upon any such inquiry. It would be noticed that the point was raised by local authorities within the Brentford Company's existing area; but application could be made for a revision of standard price, under section 1 of the Gas Regulation Act, and in that case there would be a proper investigation of figures such as could not take place at the present inquiry. Again, the London County Council (the most important local authority of all interested in the Brentford Company's charges) were not present; and they would have a good deal to say when the question of standard price came up.

Mr. Honey asked if this point was pressed.

Mr. Rowand Harker said it was news to him that it was in his objection.

Mr. Jeeves remarked that this was also the case so far as he was concerned; but he would make certain suggestions with regard to standard price, by reason of his opposition.

Mr. Tyldesley Jones said one of the representations was that the amalgamation should not be allowed to go forward on the basis of the present standard price; but he pointed out that nothing in this scheme would prejudice any application which could be made under section 1 of the Gas Regulation Act. Supposing that hereafter the standard price were to be altered, it would mean, if it meant anything, that the stocks which the Richmond and Harrow shareholders would get would not be so valuable as if the existing standard price were maintained; and he wanted to emphasize very strongly the fact that the consumers in the Brentford area would not be prejudiced in any way whatever by the amalgamation being worked out on a higher standard than might be obtained hereafter. Dealing with clauses in the Order to which objection was taken, Counsel mentioned a clause which would enable the Company to carry forward a larger amount than they are able to do at present, and another permitting them to assist financially other companies in adjoining areas, for which, again, there was precedent. It was a very useful provision—especially in such a case as this—where the district of a large company was bordered by the areas of small companies, some of whom took now, and would want to take hereafter, a supply in bulk. Clause 50, which was in the Model Bill, provided for the provision by the consumer of a non-return valve, if he used high-pressure air. The railway companies wished to place upon the Brentford Company the obligation to approve the form of valve, with a view, he supposed, of saying that, if the Brentford Company did not approve it, the railway companies' responsibility ended. But the Brentford Company were not prepared to undertake this. There was also clause 51, which relieved the Brentford Company of the necessity for giving proof of the service of notices upon any particular consumer if an advertisement had been inserted in the "London Gazette" and in local newspapers. The Richmond Corporation objected to this; but the clause had been obtained by the Gas Light and Coke Company in a Board of Trade Order in 1922. Counsel then referred to another matter raised by the Richmond Corporation, who were apparently under a misapprehension—namely, a suggestion by the Corporation that, if the Brentford Company obtained the Order, they would later get power to take over the existing undertaking of the Richmond Electric Light Company. This was quite wrong. As a matter of fact, the Brentford Company had power to do so to-day, by agreement, under authority contained in their Act of 1914; so that there was no power sought in the present Order in this respect which the Company did not possess already. Objection was also raised to the increase of capital under the Order; but there would be no actual increase of capital. There were two clauses dealing with capital. One authorized the issue of redeemable debenture stock, as part of the consideration for the transfer of the Richmond Company. When it was opportune to pay it off, the Company would want the money to do so; and a similar amount would be raised by the issue of debenture or ordinary stock. This was merely a replacement. The other clause transferred the unexercised capital powers of the Richmond and Harrow Companies to the Brentford Company.

With regard to the land at Greenford, on which it was proposed to erect new works, the existing works of Messrs. Lyons & Co. were about 400 yards from it. There was a small house within 300 yards of the site, in which Mr. Jewers—Messrs. Lyons' co-objector—lived; and it was proposed by Messrs. Lyons to build other houses within 300 yards of the site. The major part of the objection was that at Messrs. Lyons' works they carried-on the operation of tea tasting and the making-up of foods, and that these operations would be seriously prejudiced by the proximity of gas-works. Messrs. Lyons had chosen a curious site for such operations, as there was a manure works not very far away, and a sewage works. Also, the prevailing wind was south-west, and the gas-works were more likely to get the taste of tea emanating from the factory, by reason of the relation of the one to the other. There were food-producing factories near other works of the Brentford Company, but no complaints had been received. With regard to Mr. Jewers, he was the only resident who had objected, though there were a considerable number of dwellings within 300 yards; and it could be assumed that Mr. Jewers was objecting not so much in his own interests as, perhaps, in the interests of, and at the expense of, Messrs. Lyons. Messrs. Lyons must not think that, because they put down their factory in that industrial district, they were going to maintain for ever a belt of agricultural land round it. At the same time, the Brentford Company were most desirous of doing nothing to prejudice Messrs. Lyons, who were very valuable customers. As to the request by the railway companies and the Hertfordshire County Council for a clause with regard to the laying of mains in streets and on bridges, &c., he asked that no such clause should be inserted, and pointed out that the amalgamated Companies would get no greater powers for interfering with the works of the railway companies or the County Council than the existing Companies now possess.

Evidence for the Promoters.

Mr. *Alexander Avery Johnston* (Engineer and General Manager of the Brentford Gas Company) corroborated Counsel's opening statement, and dealt with some figures to show that the acquisition of the Staines and Sunbury undertakings by the Brentford Company had resulted in very great advantage in all the areas involved. Notwithstanding the war, the increase in the amount of gas sold in the Brentford area between 1914 and 1922 was 24 p.ct. In the Staines area it had been 46 p.ct., and in the Sunbury area 85 p.ct.; and this was undoubtedly due to the better facilities which the Brentford Company had been able to afford. There had also been an increase in the number of appliances

on hire in the added areas. The Brentford Company now had 130,000 consumers, two-thirds of whom used gas through slot-meters. The population of the existing area of the Company was approximately 556,000, and the gas sold in 1922 was 4,619,000,000 c.ft. The bulk of the gas was made at Southall, on the fringe of the Brentford area; and this was not so convenient as it might be from the distributing point of view. It would be true to say that a large industrial development was taking place in the north of the Brentford area and the south of the Harrow area, along the lines of the existing railways and the canal; and new trunk roads were being constructed, which would also stimulate development. There was also considerable development taking place in the south-eastern portion of the Brentford district; and as development increased so did the difficulties of the Company. The storage capacity of the Brentford Company at present was mainly at Southall, 5 miles by road from the Brentford works; and half the gas for the whole area had to be distributed from the latter works. There were two 16-in mains over Kew Bridge, for the supply of the area south of the Thames. They were compelled to use excessive pressure in these mains, and to boost a little farther on, and still there was considerable difficulty in getting sufficient gas to the outlying district. The holder station of the Richmond works, only half-a-mile from this trunk main, would be invaluable. The mains could be used for filling the holders at the Richmond works during the slack hours, and there would be no difficulty in joining-up the two systems, and so getting an equal supply throughout the whole area. The holder capacity at Brentford was equal to about 13¾ hours of the maximum day; the Harrow figure being 20 odd hours, and Richmond nearly the same. The amalgamation would result in the simplification of the distribution in Harrow. There had been great difficulty in getting gas to the south-eastern part of the Harrow area (where development was taking place) from the Harrow works; but it would be very simple to distribute in this part from the Brentford area. The facilities given by the Richmond and Harrow Companies to their consumers were undoubtedly very much less than those which could be given by the Brentford Company. The result of the amalgamation with Staines and Sunbury shows this. Whereas the average consumption in Staines was lower than in Brentford before amalgamation, it was now above it; and there was no reason why the undeveloped resources in Harrow and Richmond should not be taken advantage of. As to possibilities of development at Harrow, witness said that, when he was Engineer and Manager of the Ilford Gas Company, he had quadrupled the output in eight years; but he did not think he had ever seen anything quite so rapid as the development at Harrow. In the last eight years, there had been an increase in output of 78 p.ct., as against 37 p.ct. in the Brentford area. Last year the Company sold 523,000,000 c.ft.; and he believed they would touch 600,000,000 c.ft. this year. The development at Harrow, however, had taken place because it could not be helped, and at such a rate that the Harrow Company had enough to do to deal with the natural growth, without pressing for business. Again, the Harrow Company would find very great difficulty in supplying the demand consequent upon the British Empire Exhibition at Wembley, if the amalgamation were not proceeded with.

Dealing further with the position of the Harrow Company under the scheme, Mr. Johnston said there would be an addition to the present amounts paid as dividends of £1400 per annum, compared with the sum paid for the last period of distribution. As a matter of fact, the Harrow Company could have paid a dividend at the rate of £8 17s. 6d., whereas they only paid £6 5s. The Brentford Company would acquire the reserve and other funds of the Harrow Company; and these various funds in the case of the Richmond and Harrow Companies would be greater in proportion than the reserve fund, &c., of the Brentford Company. Coming to the price of gas to be charged in Harrow under the scheme, it was pointed out that the present price in Brentford was 9·8d. per therm, against 11d. per therm in Harrow; so that there would be an immediate advantage of 1·2d., as the price in Harrow would be the same as in Brentford. Moreover, the difference between the 2·23d. per therm extra charged to slot consumers in Brentford and the 3·6d. charged by the Harrow Company would disappear, giving the Harrow consumers a further benefit of about £2000. It was confidently believed, however, that these differences would be more than made-up by the increased sales of gas in Harrow under the amalgamation, owing to the reduced price and the greater facilities which the Brentford Company could offer in the way of apparatus. For instance, the proportion of slot consumers using stoves in Harrow was only 40 p.ct., against 100 p.ct. in Brentford; and the scope for development was further shown in the fact that the consumption per consumer in Harrow was 198 therms per annum, against 265 therms per annum in Brentford. When the district was properly developed, he believed the slot consumers in Harrow would have a higher individual consumption than in Brentford, owing to the difference in the class of population. Again, stoves on hire in Harrow were only 70 p.ct. of the total consumers, against 94 p.ct. in Brentford; one reason for this being that the Harrow Company had discontinued the hire of stoves, and had not been pushing the use of gas except to the minimum extent. As to Richmond, the works of this Company were within half-a-mile of the Brentford works, and the mains of the two Companies were close-up to each other. It was only a question of connecting, at an estimated cost of about £4000. The Richmond Company had a surplus of manufacturing and storage plant, which latter would be invaluable to the amalgamated Company. The terms of purchase in the Richmond case had been the subject of very careful consideration by the Boards of Directors; and he believed they were a fair bargain as between the shareholders and consumers in the two districts. The actual dividend paid by the Richmond Company to-day was 5½ p.ct., but they might have paid 6½ p.ct. As to the replacement of ordinary stock by debenture stock, after amalgamation the total ordinary capital of the undertaking subject to the sliding-scale would be £1,981,160, and the Richmond stock represented only 9 p.ct. of this, or £181,000. The proportion of capital subject to the slide was well above the minimum fixed by Parliament by recent legislation. The loan capital would be only 40 p.ct. of the total, after amalgamation; the rest of the capital being subject to the sliding-scale. Moreover, the Richmond shareholders were now in the position that there was a neutral zone; and the price of gas could be raised considerably before the dividends dropped. Witness then came to the question of the ratio of the consumer's share to the shareholder's share, under the sliding-scale. At present in Brentford it was 9·27 to 1 in favour of the consumer, but under the amalgamation it would be 9·39, and the same thing applied in the other districts. In Richmond to-day it was 5·51 to 1, and in Harrow it was 6·96 to 1, so that the consumer gained throughout. The present difference in the price in Richmond and Brentford would be dealt with by making seven successive reductions yearly at Richmond until Jan. 1, 1930, when the price there would be the same as in Brentford. The reason for the present difference in price in Richmond and Brentford—12·4d. per therm, as against 9 8d. per therm in Brentford—was due to the large sums spent on repairs and maintenance; but after this year this amount was likely to become more normal. Further figures were then given showing that the consumption for both ordinary and slot consumers in Richmond and Harrow was lower than in Brentford; and from this it was argued that there was a great field for development, attention at the same time being called to the lack of facilities at present for inducing people to use more gas in these two districts. The Richmond Company did not hire out stoves at all. It was intended to continue to make gas at Richmond for a while, and this would make the cost higher than if the gas were made at Brentford, and, added Mr. Johnston, it would take a little time to bring into effect all the economies which it was expected to make under the scheme.

Speaking of the new 32-acre site for works at Greenford, which actually belongs to the Company—powers now being sought to manufacture gas there—witness referred to it as an almost ideal site, with railway and canal facilities. Moreover, the works on this site would be in the centre of a growing industrial area. As to the amenities of the district surrounding the proposed new works, there was a glass company within a few yards, some cottages, a tallow and bone works, which produced a good deal of smell, an engineering works, and a wire works, all in close vicinity. There were also sewage beds put down by Messrs. Lyons for their factory near by; but these were not now used. There was not the slightest intention nor need to do any damage to Messrs. Lyons, who were large customers of the Brentford Gas Company; moreover, there was no reason why a well-conducted gas-works should be a nuisance. On this point, Mr. Johnston pointed out that the Brentford Gas-Works are 100 years old, and that High Street practically runs through them. These cause no nuisance, yet they could certainly not be regarded as really modern works. Again, at the Southall works of the Company were the works of Scott's Emulsion, Tickler's jam factory, and a food factory, all within 80 or 100 yards.

Mr. Johnston then dealt with the clauses to which objections have been taken, and first took clause 44, which deals with the application of excess profits. Until the Company's Act of 1914, there was no limitation to the amount of excess profits to be carried forward, but a clause was then put upon the Company by which the amount to be carried forward was limited to a sum sufficient to pay dividends for one year, after deducting the amount of the authorized dividend for the current half-year. It was now proposed to extend this clause to include the amount necessary to pay a year's interest on mortgages and debentures. This would amount to about £45,000, in addition to the existing powers. It was explained that there were a good many precedents for this clause in Special Orders granted by the Board of Trade in 1921, 1922, and 1923, the important point being that this carry-forward constituted working capital, which, if not provided in this manner, had to be raised on the market, and interest paid, which affected the price of gas. During the past twenty years, it was said, the Brentford shareholders had provided 30 p.ct. of the present undivided balance through not having dividends which could have been paid, whereas the consumers had not provided one penny. Had the Company raised new capital, he calculated that the cost to the consumer during that period would have been £100,000. Moreover, a substantial undivided balance had a strong influence in reducing the price of gas, because the Company could take a greater risk than they otherwise would. Then as regards the percentage of dividend to gross revenue, it was stated that the figure in 1913 was 16·3 p.ct., whereas in 1922 it had fallen to 7·7 p.ct. in the case of the Brentford Company; the gross revenue having increased from £570,000 to £1,469,000, whereas the increase in dividend had only been from £93,000 to £108,000. If the Order as drafted were sanctioned, the dividend would be 16 p.ct. of the gross revenue, as against 16·3 p.ct. in 1913, so that the Brentford Company would be practically back in the position it was in 1913. Discussing the carry forward, Mr. Johnston said that in 1913 this was equal to 25 p.ct. of the revenue, in 1922 it was equal to 12 p.ct., and under the present Order it would be 16 p.ct.—or 9 p.ct. worse than in 1913. The carry forward in terms of percentage of the expenditure was 30 p.ct. in 1913, 13·5 p.ct. in 1922, and 18 p.ct. under the present Order. Comparing it in another form, he said that the carry forward as a percentage of floating capital required for stocks and the carrying on of the business was 77 p.ct. in 1913, 50 p.ct. in 1922, and 70 p.ct. under this Order. Thus, even with the powers asked for, the Company would not be in as good a position as before the war. Clause 48—"Power to subscribe towards capital of other Companies"—was justified on the ground that it was often a good business policy to do this in the case of contiguous companies; and there was a recent precedent in the case of Swansea (1921). Clause 49—"Amending obligations as to supply of gas"—was a Model Bill Clause; and the object was to prevent the Company's being compelled to give a supply to large industrial users in districts where the mains were not large enough. One such case was Messrs. Lyons, in the Brentford area; this firm having paid a share of the cost of the necessary main in their case. The London County Council had paid a large sum towards the cost of the main required for their pumping station at Hammersmith. The Brentford Company, however, were prepared to make the clause read that they shall not be compelled to give a supply, other than for domestic purposes, in any case where the capacity of the main "at the date when the supply is demanded" is insufficient for such purpose. If the proposals as to new works in the Order were granted, the facilities for giving these large supplies would be increased, and the need for putting this clause into operation very much lessened. Clause 50 provides

that, where a consumer uses high-pressure air in his gas installation, he shall, if required by the Brentford Company, fix an efficient non-return valve for preventing the admission of such air into any service pipe. There has been one case in the district where it took seven hours to clear the air out of the service pipe, because a particular consumer using high-pressure air had no such valve; and a very serious explosion might have occurred. Mr. Johnston contended that the responsibility for fixing such valves should be upon the person using them, and not upon the Gas Company. Clause 51 provides that an advertisement in the "London Gazette" or a local newspaper shall be deemed to be proof of any notice served upon consumers. To serve individual notices upon 150,000 consumers was, said Mr. Johnston, a costly business.

Mr. Honey suggested that this went rather farther than the clause which provided that the advertisement should be deemed notice if by any chance a consumer did not receive individual notice, through inadvertence or accident.

Witness said he did not wish to avoid giving individual notice.

A series of tables were then handed in, amplifying the figures which Mr. Johnston had given in evidence, and giving the usual statistical details.

Mr. Aspinall, cross-examining for the London and North-Eastern Railway Company, discussed with the witness the question of alterations to pipes which might affect the Railway Company's property, and asked for a works clause, as given to the Great Western Railway Company by the Brentford Company in 1914, by which the Railway Company's Engineer had to pass any such works.

Witness said that this clause was in regard to a very small portion of the area: and he saw no reason for extending it to the L. & N.E. Railway now. The Gas Company always co-operated with the railway companies in these matters.

Mr. Aspinall replied that in this case the Railway Company did not think it was sufficiently covered, having regard to the possibility of electrification. Counsel then raised the question of valves in clause 50, and asked that the Gas Company should prescribe the type of valve to be used.

There was some discussion about this, but Mr. Tyldesley Jones, for the Brentford Company, interposing, suggested that there was no need for Counsel to keep pressing witness on this point, as the Gas Company emphatically refused to have the responsibility put upon them of specifying the type of valve.

Witness said he would be pleased to give any advice in regard to such valves; but all the responsibility must rest with the person using them.

Mr. Aspinall pointed out that, in the Macclesfield Corporation Act of 1923, such valves were to be approved by the Corporation, and, again, in the Chesterfield Act of last session there was the same provision.

Mr. Tyldesley Jones said these were both agreed clauses, without discussion.

Mr. Rowand Harker then cross-examined for the Barnes Urban District Council. The most important point which he raised, and one which ultimately led to the day's proceedings coming to a close a little earlier than anticipated, in consequence of a ruling being asked of the Director of Gas Administration, who wished to consider the point, was in regard to a lower offer having been made by the Wandsworth Gas Company for the purchase of the Richmond Company.

The facts as they were elicited during this part of the proceedings, in which there were many passages between Counsel, are that the Richmond Directors signed the agreement with the Brentford Company on April 21, that the offer of the Wandsworth Company was made on May 9, that the meeting of the Richmond shareholders to consider the Brentford agreement was held on May 24, and that no mention was made at this meeting of the fact that a lower offer had been made by the Wandsworth Company.

Mr. Tyldesley Jones said he had not referred to this matter in his opening because he did not consider it had anything to do with the inquiry. The Director of Gas Administration was not there to hold an auction of the Richmond Company; but if this matter was to be gone into, then every detail must be dealt with, and not merely one part. While contending that the question was quite irrelevant to the inquiry, he was prepared to go into the whole matter, which would take some time. The Wandsworth Company did not appear as objectors to this Order; and he asked for a ruling on the point.

Mr. Harker contended that it was part of the duty of the Board of Trade in these matters to inquire into whether a fair bargain had been made—in this case between Richmond and Brentford—in the interests of the consumers in Richmond. His submission was that a better offer, so far as the consumers were concerned, had been made to the Richmond Gas Company, and that the Directors of this Company had that offer in their pockets at the meeting of the shareholders on May 24, but said nothing about it to the shareholders. The offer was made by people who were perfectly capable of carrying it out; and he could prove that the offer was still open.

Mr. Honey: Suppose the Barnes Urban District Council made out their case, what are you asking the Board of Trade to do?

Mr. Harker said he would ask the Board of Trade not to pass this Order. He was perfectly well aware that he could not ask the Board of Trade to tell the Richmond Company to sell to somebody else, because the Board had no power to do it. His point was that a fair bargain had not been made in this case.

Mr. Honey: Are you in a position to give evidence as to the whole of the circumstances connected with this offer?

Mr. Harker: Yes.

Mr. Honey asked how the Barnes Urban District Council knew about this offer at all. Could Mr. Harker call evidence that the offer was still open?

Mr. Harker said that those who instructed him read the local papers, and they had seen communications to the Richmond Town Council. Moreover, he could call the best evidence to prove that the offer had been made, and that it was still open.

Mr. Honey said he wished to hear any evidence that was really relevant to the question of the protection of the consumer, but he was bound to say that he did not see what use it was to hear evidence with regard to another Company. What Mr. Harker had to do was to convince him that the bargain between the Richmond and Brentford Companies was an unfair one, so far as the consumers were concerned.

After a little discussion between Counsel—in which opinions differed—as to the practice of Parliamentary Committees in such matters,

Mr. Honey said he would give his decision on the point on the following morning.

Tuesday, Oct. 16.

The resumption this morning was delayed for over half-an-hour, during which time consultations were going on between the parties. Nothing came of all this, however, and the inquiry proceeded.

Meantime, an application had been made on behalf of the Alkali Manufacturers' Association for the insertion of the Model Bill clause as regards residuals.

Mr. Tyldesley Jones objected to the Association being heard, as no notice had been lodged.

Mr. Honey said he would consider the application when the proper time came—on the consideration of clauses.

When the proceedings were resumed, the first matter raised was as to the decision of the Director of Gas Administration upon the point made by Mr. Harker the previous evening concerning the Wandsworth offer. Mr. Honey, however, was not called upon to decide anything, as Mr. Tyldesley Jones announced that, having considered the point, while still regarding the introduction of this offer into the proceedings as irrelevant, he was willing to withdraw his objection, on the understanding that he should be allowed to deal with the matter as he thought fit in re-examination of his witnesses. The point was gone into with Mr. Johnston at a later stage.

Mr. Rowand Harker then resumed his cross-examination of Mr. Johnston, and dwelt upon the question of issuing the £181,000 of existing Richmond stock as debentures in the amalgamated Company as being prejudicial to the consumers, and suggested that a better security was being given to the Richmond shareholders than they now had. He also asked why there had been a difference in the treatment of the Harrow shareholders and the Richmond shareholders.

Witness said the Richmond shareholders preferred to be paid in debentures, while the Harrow shareholders preferred ordinary stock. He admitted that he knew of no precedent for giving debenture stock in exchange for ordinary stock; but in spite of treating the Richmond capital in this way, there would be 60 p.ct. of the capital of the amalgamated Company subject to the sliding-scale, which was well above the statutory minimum. Coming to compensation for officials, he said it had been agreed to compensate the Engineer of the Richmond Company for loss of office on a basis of seven years at £1100 a year, his present salary. In the case of the Harrow Company, arrangements had been made to compensate the gentleman holding the combined post of Engineer and Manager on a basis of ten years at £1400 per annum, or £14,000.

Mr. Harker referred to clause 48, giving the Brentford Company power to invest in other companies.

Mr. Tyldesley Jones, however, cut the cross-examination short by agreeing that as it was drafted the clause would allow the Company unlimited powers without any control, and he offered to add the words "with the consent of the Board of Trade," so that the Company could only invest in other companies with this consent.

Mr. Harker pointed out that the Richmond Company had a larger storage capacity in reserve, proportionately, than the Brentford Company, and that without this Order the Brentford Company would be faced with a large expenditure in that direction. This must be reflected, he said, in the price of gas in Brentford, whereas the price of gas in Richmond and Barnes would not be so affected. He claimed this as a factor which did not help to justify the maintenance of the differential price in Richmond. Another factor in this connection was the capital expenditure per million. He put it that the figure for Brentford in 1913 was £360, as against £475 in Richmond; but that in 1922, whereas the Brentford figure had risen to £393, the Richmond figure had fallen to £411. It had also been pointed out that the high cost of maintenance in Richmond in the past would soon come to an end; and altogether he urged that there was no justification for the differential rate on the ground that it would cost more to distribute gas in Richmond for the first few years under the amalgamated scheme.

Witness said it would take a few years before the full economies of the scheme would be operative; but in the meantime the Richmond consumer would get an immediate benefit of 1·4d. per therm, and the remaining 1·2d. would disappear at the end of seven years.

Mr. Szlumper put a number of figures, some of which came from "Field's Analysis," and some of which were estimates, tending to show that the cost of supply was higher in Brentford than in Richmond, and that therefore there was no justification for the differential price in Richmond.

Witness replied that he had taken the figures as they actually were at present, and had come to the conclusion that the Richmond Company would not be able to reduce the price of gas for a long time.

Counsel continued to put a number of figures of prospective cost.

Mr. Tyldesley Jones remarked ultimately that apparently it was to cost the Brentford Gas Company 12·16d. per therm for gas which they were selling at 9·8d. This cross-examination was rather confusing.

Mr. Szlumper asked why it was that there was provision for the officers who could look after themselves, and no provision for compensation for the workmen who might be displaced.

Witness said that an undertaking had been given to take over all the workmen, and he would certainly resist any suggestion that they should be compensated.

Mr. Szlumper referred to the Redhill and Reigate amalgamation, in which provision was made that the workmen should not be discharged by reason of the transfer. Another precedent, he said, was the Folkestone Gas Act of 1916. Referring to clause 49, which gives the Company power to refuse supply, except for domestic purposes, where the mains are of too small a capacity, Mr. Szlumper suggested the insertion of the words "until the expiration of six months of the serving of the notice," thus making it compulsory upon the Company

to give a supply at the end of six months from the time it was asked for; but Mr. Johnston would not agree to this.

Mr. JEEVES, K.C., representing the Brentford, Hanwell, Heston and Isleworth, and Twickenham Urban District Councils, in his cross-examination made the point that the issue of debenture stock to the Richmond shareholders for their present ordinary stock, in effect, converted the Company from a sliding-scale to a maximum-price Company—so far as these shareholders were concerned. He also put it that the terms of purchase had been arranged upon a basis of cost when these were 2·30 times above pre-war, inasmuch as the 1921 figures had been taken to fix the Richmond Therm Order; and the sale was upon the therm price so fixed.

Mr. Johnston's reply was that whereas the consumer's share under the sliding-scale, as an average of the three Companies, now was 9 27 to 1, under the amalgamation it would be 9·39 to 1.

Mr. JEEVES, however, contended that the effect of issuing the £181,000 as debentures instead of ordinary stock must be to make the consumers' share lower than it would be; and he put it definitely to Mr. Honey that such a proposal was not only without precedent, but was a retrograde step. It was virtually saying that the sliding-scale was wrong in principle.

Witness said he would agree, if the sliding-scale were done away with altogether.

Another matter dealt with by Mr. Jeeves was the payment of the income-tax in connection with Directors' compensation. There was no mention in the accounts of the payment of this income-tax; and he stated that, without a special resolution of the Board, such a payment was illegal, and the Director of Gas Administration must not take it into account.

Arising out of questions with regard to the proposal to increase the number of Directors, Mr. TYLDESLEY JONES, for the Brentford Company, agreed that as the clause stood it would be possible for Directors of the Richmond and Harrow Companies who had been compensated to be elected to the Board of the amalgamated Company. Mr. Johnston, however, repeated what he had previously stated—that there was no intention to do this.

Mr. JEEVES, summing up, put it that 20 p.ct. too much was being paid for the Richmond Company's undertaking.

Questions were then put by Mr. MACMORRAN, K.C., for Messrs. Lyons, in which it was suggested that the operations of tea tasting, and the manufacture of cocoa, chocolate, and confectionery would be seriously interfered with through the presence of noxious fumes from the gas-works.

Witness, in the course of his re-examination, dealt with the Wandsworth offer to the Richmond Company, and said that, though the offer was to supply gas at 9·4d. per therm, which was lower than the Brentford price of 9·8d., regard must be paid to the fact that the Wandsworth's charges for meters, &c., were higher, and the total was about the same as in the case of Brentford. As to slot consumers, however, the extra charges in the case of the Wandsworth Company were 3·6d. per therm, as against 2·2d. per therm in Brentford.

Mr. TYLDESLEY JONES, in answer to Mr. Honey, said the point was that the Richmond consumers could not be supplied as cheaply by the Wandsworth Company as by the Brentford Company, after the differential rate had disappeared; and, further, it was physically impossible for the Richmond area to be amalgamated with the Wandsworth area, and therefore the Richmond undertaking would have to be maintained as a separate one, and so lose the ultimate advantages of a big amalgamation scheme such as the one now proposed. Taking the slot consumer, he put it that, whereas under the Wandsworth proposal they would have to pay 9·4d. per therm for gas, and 3·6d. per therm for fittings, making 13d. in all, under the Brentford scheme, the charge would be 11d. *plus* 2·2d., or 13·2d. for the first year, for the second year it would be 13d., and in subsequent years it would be less than under the Wandsworth offer.

Witness, referring to the capital expenditure per million, said that this had been adversely affected by taking over the Staines and Sunbury undertakings, and also by the high cost of money during the war, when mortgage bonds were issued to provide working capital. The present amalgamation, however, would enable the existing reserve plant to be used more effectively, so that the present capital cost per million would be reduced.

Mr. *W. Cash* (Messrs. Cash, Stone & Co.) gave evidence on the financial proposals of the scheme. The scheme, he said, provided for a much larger proportion of loan capital than existed in the three Companies at present; and this was all to the benefit of the consumer, because loan capital could be raised at a lower rate of interest. From this point of view, therefore, the payment of the Richmond shareholders in debentures instead of ordinary stock was an advantage to the consumers, because the rate of interest was fixed, and, being redeemable debentures, the Directors could replace them, when conditions were favourable, at a lower cost. Under the scheme, the Harrow shareholders would get £1457 per annum more in interest than they got now. This had not been challenged by anyone; yet the fact that the Richmond shareholders would get £906 more in interest per annum under the scheme was challenged. The effect of these proposals upon the price of gas was infinitesimal, whereas, so far as the Richmond proposals were concerned, the consumers were getting an immediate benefit of £9270. As to compensation to Directors, there were precedents for the steps proposed, and there were cases in which the number of years was greater than seven. When the Tottenham Gas Company took over the Enfield Company, the period was eight years. There were also many precedents for the carry forward to include an amount sufficient to pay one year's interest on the loan capital. As to the Wandsworth offer, this Company had always been notoriously high in their charges for meters and fittings, and the matter had been brought before the Profiteering Committee, when it was stated that if the price of gas was increased it would affect the dividends. Therefore the Company increased meter rents and the charge for fittings.

Wednesday, Oct. 17.

Thanks to an opportune intervention by Mr. Honey, the inquiry was very considerably shortened to-day, and the main opposition had been disposed of by lunch time. It had seemed that the inquiry would have lasted several more days, but in the new circumstances it was finished—a late sitting taking place for this purpose.

Mr. *Cash* had been cross-examined by Mr. Jeeves on behalf of what had been called the Brentford group of urban district councils, and partly by Mr. Harker for Barnes; the main point being that the consumers were being damaged by the scheme. But in the light of subsequent events, it is not necessary to go into this cross-examination in detail. The features of these oppositions have already been indicated. Mr. Jeeves's point was that, owing to the differential price to be maintained in the Richmond area, an extra burden would be placed upon the consumers now being supplied by the Brentford Company. This really was the main point of substance; the other objections being made as a matter of course, to present something like a substantial case. On the other hand, while the complaint of the Brentford group of local councils was that the Brentford Company were giving away too much to the newer areas, the areas to be taken in under the scheme complained that they were not being treated generously enough.

It was at this stage that Mr. HONEY intervened, and said he had been impressed by the fact that the financial difference between the parties in this respect was so small that it would be more than wiped out in Counsels' fees, &c., by prolonging the inquiry another day; and he suggested, without wishing to force a compromise, that the promoters and the local authorities might have a conference on this matter, and try to come to an arrangement.

There was, therefore, an adjournment for about half-an-hour; all the Counsel concerned expressing an eager willingness to be as reasonable as possible. When the parties re-appeared,

AN AGREEMENT WITH THE LOCAL AUTHORITIES.

Mr. TYLDESLEY JONES announced that an agreement had been come to with the local authorities on all the main points. The agreement was that the differential in the Richmond area should be 1·2d., as in the draft Order, but that it should disappear by stages of 0·4d. per therm per annum, so that it would only last for three years.

Apparently all the other points raised by Counsel for the local authorities were dropped, as they were not mentioned in the terms of the agreement.

Mr. JEEVES, however, raised a point in connection with the clause which enables the Brentford Company to subscribe to the capital of other companies, and suggested that, even with the proposed addition of words—already offered by the promoters—making any such subscription subject to the consent of the Board of Trade, the clause was still objectionable inasmuch as it permitted, practically, of amalgamations of companies without a public inquiry of any sort. He suggested that the Department would not be well advised to pass this clause.

Mr. TYLDESLEY JONES at once said that, as the clause seemed to raise some doubt or difficulty, in view of the fact that the opposition had already met the promoters most fairly, he was authorized to withdraw it.

POINTS OF OPPOSITION REMAINING.

There thus remained only the question of Messrs. Lyons' opposition to the use of the land at Greenford for gas-making purposes, and certain smaller points.

Mr. SZLUMPER, for the Richmond Corporation, addressed the Director, and asked for some protection to be given to workmen by way of compensation for loss of work under the amalgamation scheme, and quoted the Redhill Order of 1921 as a precedent for doing this. It was suggested that this should be added to clause 29, which provides for compensation to officers who are not taken over by the amalgamated Company. As to clause 49, which says that the Company shall not be compelled to give a supply except for domestic purposes where the main is not of sufficient size, he asked that words should be inserted making the clause read that the Company shall give such supply at the expiration of six months after receiving the application. There were many precedents for this clause; and he mentioned Harwich, Cambridge University and Town, Redhill, and Welwyn in 1921, and Elstree and Boreham Wood, Hessle, Hinckley, Sittingbourne, Sutton, and Wellington in 1922.

Mr. TYLDESLEY JONES interjected that these were all agreed cases.

Mr. SZLUMPER then called attention to clause 51, dealing with notice to consumers; the point being that if, by any chance, a consumer is not given individual notice of any change in the conditions of supply, an advertisement in the local paper or the "London Gazette" would exonerate the Company. Mr. Szlumper's point was that the Company did not intend to give any individual notices at all; whereas the Richmond Corporation held very strongly that every consumer should have individual notice, and that advertisements in the local paper or the "London Gazette" should not be substituted as a general rule.

Sir H. COURTHOPE-MUNROE, on behalf of the Hertfordshire County Council, asked for a works clause in a special form, as regards roads and bridges. The clause he asked for was section 31 of the Ware Order of this year, which in that case had been inserted by agreement, and had, he said, also been granted in twelve cases altogether to the Hertfordshire County Council. The promoters, however, in their objections to the proposed clause had stated that there were no new powers in the present draft Order *qua* roads, and that this was therefore not an occasion to alter the existing conditions. On this point, Counsel emphasized that there has been an extraordinary change in the conditions of road traffic since the Gas-Works Clauses Acts of 1847 and 1871, and that as this scheme, by reason of the amalgamation, is really an extension of the limits of the Brentford Company, he would be fully entitled to ask for a change in the works clauses if he were before a Committee of Parliament. The Company were seeking to apply the powers they now had in Brentford to the Harrow area, which came within Hertfordshire. The facts were practically the same as those discussed in the Kidsgrove Bill, and also in connection with the Hyde and Marple Orders. In the Kidsgrove case, the clause, substantially as he was now asking for it, had been granted to the County Council. He urged upon the Director to give full consideration to applications of this nature, inasmuch as this Department of the Board of Trade now took the place of Parliamentary Committees.

Mr. TYLDESLEY JONES corrected this, and replied that there was still an appeal to Parliament by opponents.

XUM

Sir H. Courthope-Munroe said this was true, but the procedure was for these Orders, after they had been passed by the Board of Trade, to lie upon the Table; and it was only by doing a certain amount of lobbying that it was possible to get them before a Committee. In these circumstances, he hoped the Board of Trade would consider these matters on their merits, and not be influenced by the cry that it was sought to alter past legislation. In support of his contention that the old Gas-Works Clauses Act was now out of date, having regard to modern traffic conditions, Counsel quoted figures of the vast increase in road traffic, necessitating improvements in the roadways, which in turn meant alteration and relaying of gas and other mains. He also drew attention to the scheme of the Minister of Labour for the construction of new roads at an enormous outlay, a large portion of which money would be spent in Hertfordshire. The clause he asked for was a long one; but it is summarized below.

In the first sub-section, it is stated, in effect, that the position and depth of a gas-main shall be determined by the County Council, subject to arbitration. This had been accepted by Parliament in the Kidsgrove Act, and agreed to in the Marple Order. Sub-section 2 asks for seven days' notice instead of three—again, it was added, granted in Kidsgrove and agreed to in the case of Hyde. Sub-section 3 provides for a plan being prepared by the Gas Company. Sub-section 4 says that the Company shall not be entitled to stop the traffic. It was explained that clause 10 of the Gas-Works Clauses Act is a loosely-worded one, and that the more definite provision now asked for is in the Kidsgrove Act and Hyde Order. Sub-section 5 refers to interference with county bridges, and was granted in Kidsgrove, and agreed in Ware. Sub-section 6 (the really important one) provides that where any alteration of county bridges is being made, the county council may require the gas-mains to be moved in the manner prescribed by them at the Company's expense, subject to arbitration.

Mr. Tyldesley Jones drew special attention to this, and strongly objected.

Sir H. Courthope-Munroe said the Hertfordshire County Council held it was reasonable that the cost of these alterations should fall upon the Gas Company, seeing that they were necessitated by the changing conditions of the times and the fact that the roads were being widened and modernized for the general benefit of the community, the gas-mains having been laid at a time when things were very different. In these circumstances, the Gas Company should bear their share of the cost.

Mr. Tyldesley Jones remarked that the Company paid an enormous share of the rates, which included the cost of removing pipes when road widenings were carried out; and they got nothing for it.

Sir H. Courthope-Munroe said the Ministry of Transport had in view a large scheme for Hertfordshire involving the widening of a main road from 21 ft. to 30 ft., to take in all the grass sides, under the Government proposals for giving work to the unemployed. This would involve the removal of a large quantity of gas-mains; and it was not right that the cost of this removal should be at the expense of the county. This was a proposal which, he was instructed, he must press very strongly in the interests of the ratepayers.

Sub-section 8 of the proposed clause deals with the recovery from the Gas Company of any damage done to county bridges by the Company, and sub-section 9 provides for paying for damage caused by burst pipes.

The opposition of Messrs. Lyons and Mr. Jewry, one of their employees living in a cottage near the proposed new gas-works, was then taken. This part of the case, which occupied several hours, can, perhaps, better be dealt with in the form of a story than by a seriatim recounting of the somewhat prolonged evidence and arguments adduced.

The short position is that the Brentford Gas Company already own some 32 acres of land at Greenford, at present unoccupied, upon which it is proposed to erect new gas-works. Adjoining this land belonging to the Gas Company, Messrs. Lyons have a large area upon which, in 1919, they built a works employing at the present time some 2500 people. These works are devoted to tea tasting, blending, and packing, and also the manufacture of cocoa, coffee, chocolates, and confectionery; and the strongest possible objection was taken to the erection of gas-works upon the land adjoining, and now in the possession of the Gas Company, though there are at present no powers to erect works there.

The promoters called as their witnesses on this point Mr. *W. Doig Gibb*, who spoke as to the close proximity of food factories to gas-works in other parts of the country. Special reference was made to the Granton works of the Edinburgh Corporation, the Doncaster works, and the York works, close to each of which are flour mills, to the Reading works, which actually adjoin the biscuit factory of Messrs. Huntley and Palmer, and to the fact that Messrs. Rowntree's works at York are only about half-a-mile from the gas-works. A great point was made by the promoters of the fact that Messrs. Lyons' works were erected at a time when a bone manure works were already in the neighbourhood at Greenford; and, in addition, Messrs. Lyons themselves have erected a small sewage farm on their own lands, much closer to the factory than the gas-works will be. There are also existing at the present time, within a few hundred yards of Messrs. Lyons' works, a wire works, a white-lead works, and an engineering works, where experiments are being carried out with a gas process. Mr. *G. L. Vigers*, of the firm of Messrs. Vigers & Co., Surveyors, also gave evidence, and spoke of tea and food factories in other parts of the country being close to gas-works, without being injured.

The main case made out on behalf of Messrs. Lyons, by Mr. Macmorran, was that the presence of a gas-works would so vitiate the atmosphere that the operations of tea tasting would be rendered impossible, and that the quality of their products would be prejudicially affected. Witness after witness was called—many of them tea tasters, some employed by the firm, and others independent experts—who spoke to this effect. Their cross-examination by Mr. Tyldesley Jones was on the lines that the bulk of the tea tasting in this country is done in the very heart of London, where no one could suggest that the atmosphere was so perfectly pure as Messrs. Lyons had alleged is necessary for this purpose. Moreover, Messrs. Lyons' witnesses had admitted that their own small sewage works—which will be discontinued as soon as arrangements are completed for running their sewage into the main drainage system—had created very bad smells, and also that they had had to complain of the smells emanating from the bone manure works, which existed when Messrs. Lyons' works were erected. It was stated that action could not be taken against the bone manure works for nuisance, because Messrs. Lyons' own sewage works had also created a nuisance, but that when the sewage works are dismantled action will be taken against the bone manure works.

The cross-examination also took the line that none of the witnesses had ever conducted the operation of tea tasting near a gas-works, nor had they taken the trouble to try to do so for the purpose of this case. Another point made for the promoters was that the prevailing wind in this quarter is such that the gas-works are much more likely to get the smells from the sewage works, if they are not dismantled, than is Messrs. Lyons' tea-tasting department (which is 600 yards from the nearest point to the gas lands) likely to get any smell or fumes from the gas-works. There was also, of course, the strong argument that a modern gas-works created no nuisance; and evidence of this were the Southall works, where, as already mentioned, there are, within a few hundred yards, Scott's Emulsion works and other food-producing works.

In his speech to the Director in reply to the case made for Messrs. Lyons, Mr. Tyldesley Jones said it was the established law that if a person carried on an extremely delicate operation—such as tea tasting was said to be—he must take precautions to protect himself against any other person's operations, so long as these did not come within the category of a legal nuisance, for which, of course, there was a remedy at law. He claimed that Messrs. Lyons must be so treated, and that in going to Greenford they took an ordinary business risk, subject to their right at common law to go to the Courts in respect of a legal nuisance, which right existed against a gas-works as well as anyone else. If, as had been suggested, the slightest modification of a perfectly pure atmosphere upset the operation of tea tasting and blending, it was for those carrying out those operations to take adequate steps to protect themselves against such a disturbance. If the view of Messrs. Lyons were to prevail, the same might be said of many other operations, and it would be well-nigh impossible to erect a gas-works anywhere.

Mr. Aspinall then asked the Director to insert a full works clause for the protection of the London and North-Eastern Railway Company, the Metropolitan Railway Company, and the Metropolitan and Great Central Joint Committee. He adopted the argument of Sir H. Courthope-Munroe, that the Gas-Works Clauses Act legislation is antiquated, and added that the Brentford Company in their 1914 Act gave a full works clause to the Great Western Railway Company, and that full works clauses had been inserted in Orders relating to Hinckley, Hyde, Cambridge, and Salisbury, and which went farther than the Model Clause in this respect. Speaking with regard to clause 50, which stipulates that a person using high-pressure air shall employ a suitable non-return valve to prevent the air getting into the Gas Company's mains and causing an explosion, Counsel urged that the Company should stipulate the form of the valve, to ensure that persons using it should put in the right thing, and not be compelled afterwards to replace it. He mentioned that such a stipulation was to be found in Orders relating to Bridlington, Hyde, and Marple, in the Chesterfield Corporation Act of 1921, and in the Macclesfield Corporation Act, 1923. He therefore asked that the word "approved" should come in before the words "efficient valve" in the clause.

Mr. Tyldesley Jones emphatically refused to have the responsibility of stipulating the form of valve placed upon the Gas Company.

Mr. Honey asked if the railway companies used high-pressure air.

Mr. Aspinall said that the London and North-Eastern Railway, in their Northern Group, used high-pressure air; and it was probable that the Company would wish to adopt it in their southern area. He agreed that the use of high-pressure air might be a danger to other users if an efficient valve were not used, and said it was for this reason the Railway Company asked the Gas Company to approve the form of valve to be used.

Mr. Honey said the point he would have to be convinced on was the question of onus.

Mr. Aspinall did not wish to place the onus on the Gas Company, but would like the word "approved" in the clause, so that his engineers would not put in a valve which the Gas Company could make them take out again, and so involve useless expense.

Mr. Tyldesley Jones again emphatically refused to accept the responsibility for the type of valve, but offered to give the Railway Company the benefit of the Gas Company's experience in the matter. Replying to some of the points made by Sir Harry Courthope-Munroe, for the Hertfordshire County Council, he said that most of what was asked for was already provided for in the Gas-Works Clauses Act, and seeing that only a very tiny portion of Hertfordshire came within the Company's area, and that other counties, such as Surrey and Middlesex, in which the Company's area mainly was, did not claim special protection, he asked the Director to refuse special protection to Hertfordshire. If the cost of altering pipes through road improvements was to be thrown upon local gas consumers, it would be unfair, seeing that, among other things, the improvements were for the general good of the traffic of the country which passed through the various counties.

Mr. Honey said that, assuming the works clause remained in the present form, he thought that in drafting the final Order the Board of Trade would not authorize the construction of works by reference to the old Brentford Act—as was the case in the Draft Order—but would put in the usual works clause with the residuals restriction.

Mr. W. A. Clark (Messrs. Kennedy & Co., Parliamentary Agents), for the Alkali Manufacturers' Association, on this latter point, again made his application for the residuals clause to be inserted as regards the new Greenford works.

Mr. Tyldesley Jones said the Company had not at present a residuals clause imposed upon them, even though they were in Parliament in 1919; and he asked the Director to preserve uniformity in this respect in regard to the whole of the Company's works.

Mr. Honey asked why the Alkali Manufacturers' Association did not ask for a residuals clause in respect of the Southall works authorized in 1919.

Mr. Clark replied that the Act of 1919 was a 1918 promotion, when

the war was on, and the Alkali Manufacturers' Association did not think it was patriotic to ask for the residuals clause in those circumstances. The clause had been inserted since the war, however; and the special reason why he asked for it in respect of the Greenford works was that the Brentford Company were now one of the large companies for which the clause was originally mainly intended, so as to protect the chemical manufacturers of the country against unrestricted chemical manufacturing operations by big gas companies. Moreover, the Harrow Company, one of the companies to be absorbed under this scheme, obtained an Order in 1922 in which the residuals clause appeared.

Mr. TYLDESLEY JONES urged the Director not to impose the residuals clause. He said it was found during the early part of the war that the manufacture of high explosives in this country was being seriously retarded by the existence of this protection which the Alkali Manufacturers' Association had obtained in time of peace. He challenged the Association to raise the matter on the floor of the House of Commons, so that Parliament might have an opportunity of considering it. It was about time that this protection, which very nearly caused irreparable injury to this country during the war, should be removed. The interests of the country had been sacrificed to a ring of chemical manufacturers, and it was time Parliament had an opportunity of altering this state of affairs, which was monstrous.

This concluded the outstanding points of principle in connection with the Order; but there is one point which is to be discussed privately in Mr. Honey's room between the promoters' Parliamentary Agents and the Agent representing Mr. W. J. Herman—Assistant to the Secretary and Manager of the Harrow Company—who, we understand, is offered employment with the Brentford Company on terms not less favourable than those of his existing employment, but who wishes to be entitled to refuse to accept such employment and to claim compensation.

EASTBOURNE GAS ORDER.

On Friday, at the offices of the Board of Trade, Mr. H. C. Honey held an inquiry into the application of the Eastbourne Gas Company for an Order under section 10, extending the limits of supply, &c. Our report of the proceedings is held over until next week.

METROPOLITAN GAS COMPANIES' OFFICIAL TESTINGS.

The reports of the Gas Referees of the official testings for the past quarter under the provisions of the Gas Regulation Act give the following average calorific values for the gas supplied by the Metropolitan Companies named.

Brentford Gas Company.—478·4 B.Th.U. from July 1 to Sept. 25, and 504·3 B.Th.U. from Sept. 26 to Sept. 30 (declared calorific value, 460 B.Th.U. from July 1 to Sept. 25, and 500 B.Th.U. from Sept. 26 to Sept. 30).

Commercial Gas Company.—483·5 B.Th.U. (declared calorific value, 475 B.Th.U.).

Gas Light and Coke Company.—501·3 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—566·1 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—485·2 B.Th.U. from July 1 to Sept. 12, and 482·6 B.Th.U. from Sept. 13 to Sept. 30 (declared calorific value, 460 B.Th.U. from July 1 to Sept. 12, and 480 B.Th.U. from Sept. 13 to Sept. 30).

Wandsworth, Wimbledon, and Epsom District Gas Company.—473·5 B.Th.U. (declared calorific value, 470 B.Th.U.).

Plymouth Gas Company's Second Reduction this Year.

For the second time this year, the Plymouth and Stonehouse Gas Light and Coke Company have made a reduction in the price of gas, which has now been lowered from 7d. to 6½d. per therm, to take effect from the reading of meters in September last. The rates for engine consumption are reduced to 5·9d. per therm, and there will be similar reductions for Plympton and other outlying districts and towns supplied by the Company. The reduction, together with the 1d. per therm taken off in April last, represents a saving of considerably over £30,000 to the consumers. It was pointed out that a reduction of ½d. per therm was equivalent to 2½d. per 1000 c.ft., and that the price had thus been reduced by 6½d. per 1000 c.ft. during the year. The present rate—equivalent to 2s. 5½d. per 1000 c.ft.—is less than 50 p.ct. above pre-war figures. The Company are enabled to make this reduction through a fall in the price of coal and oil, and also a reduction in the wages of the employees under the National agreement. It has always been the aim of the Company to keep their rates as low as is consistent with the manufacture of best quality gas, so as to make it possible and economical for people to use gas instead of coal for heating and cooking.

Tamworth Gas Light and Coke Company.—At an ordinary general meeting of the Company last week, a recommendation of the Directors was adopted to pay dividends for the half-year ended June 30 last of 7½ p.ct. per annum on the old shares and 5¼ p.ct. on the new. The accounts showed a decided improvement.

American Benzole Production.—According to figures given by Mr. D. W. Jayne, President of the firm of Jayne and Sidebottom, the quantity of benzole produced in the United States for 1920 was 70 million gallons, compared with an output of 285,000 gallons in 1904. During 1921 and 1922, approximately 90 p.ct. of the light oil was produced as compared with the figures for 1920. Some of the larger companies found little difficulty in securing coal for their coke-ovens during the shortage, and, as a consequence, many have kept their production up to 95 p.ct. Several of the smaller plants, however, had coal difficulties; and it is believed that their figures were lower. An average production of about 90 p.ct. is a fair estimate.

CHEAPER GAS AT HALIFAX.

"Standard Requirement" Scheme for Domestic Purposes.

By means of circulars and attractively arranged advertisements, the Gas Department of the County Borough of Halifax (of which Mr. W. B. M'Lusky is Engineer and Manager) draw attention to the fact that, from the meter readings in March, 1924, consumers for domestic purposes may be supplied with gas in accordance with a scale of prices fixed by the Corporation as an alternative to the present "standard requirement" scheme. The details of this alternative scheme are thus set out in the circular.

2s. per 1000 c ft. within the borough, plus a fixed charge payable quarterly in accordance with the scale below.

A fixed charge of 1d. per week for every 1000 c.ft. or part of 1000 c.ft. in the "standard requirement," *plus* a charge of 2s. net within the borough, for every 1000 c.ft. of gas consumed, with the proviso that the minimum fixed charge per week be 9d., and in accordance with the following scale.

Amount of Standard Requirement per Annum.	Fixed Charge per Week.	Fixed Charge per Quarter.
	s. d.	s. d.
9,000 c.ft. or less	0 9	9 9
10,000 ,, ...	0 10	10 10
11,000 ,, ...	0 11	11 11
12,000 ,, ...	1 0	13 0
13,000 ,, ...	1 1	14 1
14,000 ,, ...	1 2	15 2
15,000 ,, ...	1 3	16 3

This continues at the rate of 1d. per week for each 1000 c.ft. or part of 1000 c.ft. in the "standard requirement" above 15,000 c.ft.

This is really an extension of the present "standard requirement" scheme which, since its inception early in the year 1917, has been adopted by over 5000 consumers in Halifax.

The "standard requirement" is based upon the floor area of the living and reception rooms. Suppose, for example, that the combined area of the living and reception rooms in a house amounted to 320 superficial feet, the "standard requirement" per annum would be found as follows:

$$320 \times 37\tfrac{1}{2} \text{ c.ft.}^* = 12{,}000 \text{ c.ft.}$$

The first 12,000 c.ft. of gas used over the year would then be charged at the ordinary rate, 3s. 11d. per 1000 c.ft. within the borough, and all gas used in excess of this amount at 3s. 5d.

A large number of consumers use more than three times the "standard requirement" volume of gas in the course of a year, and the new scale will be a great advantage to such consumers, as the following examples show:

(1) Standard requirement per annum . . . . . 9,000 c.ft.
Actual consumption of gas per annum . . . . . 49,700 c.ft.

Present Scale.	s. d.	New Scale.	s. d.
9,000 c.ft. of gas at 3s. 11d. per 1000 c.ft.	35 3	Fixed charge 4 quarters at 9s. 9d. per quarter . . .	39 0
40,700 c.ft. of gas at 3s. 5d. per 1000 c.ft.	139 1	49,700 c.ft. of gas at 2s. per 1000 c.ft.	99 5
Total . . .	174 4	Total . . .	138 5

Advantage to the consumer over the year, 35s. 11d.

(2) Standard requirement per annum . . . . . 12,000 c.ft.
Actual consumption of gas per annum . . . . . 43,000 c.ft.

Present Scale.	s. d.	New Scale.	s. d.
12,000 c.ft. of gas at 3s. 11d. per 1000 c.ft.	47 0	Fixed charge 4 quarters at 13s. per quarter . . .	52 0
31,000 c.ft. of gas at 3s. 5d. per 1000 c.ft.	105 11	43,000 c.ft. of gas at 2s. per 1000 c.ft.	86 0
Total . . .	152 11	Total . . .	138 0

Advantage to the consumer over the year, 14s. 11d.

(3) Standard requirement per annum . . . . . 15,000 c.ft.
Actual consumption of gas per annum . . . . . 56,200 c.ft.

Present Scale.	s. d.	New Scale.	s. d.
15,000 c.ft. of gas at 3s. 11d. per 1000 c.ft.	58 9	Fixed charge 4 quarters at 16s. 3d. per quarter . .	65 0
41,200 c.ft. of gas at 3s. 5d. per 1000 c.ft.	140 9	56,200 c.ft. of gas at 2s. per 1000 c.ft.	112 5
Total . . .	199 6	Total . . .	177 5

Advantage to the consumer over the year, 22s. 1d.

FOR BUSINESS PURPOSES.

As an alternative to the present scale of charges for gas used for business purposes, consumers may arrange to pay a fixed charge of £2 per annum per indicated horse power (or the equivalent of horse power) demanded, and have the whole of the gas used for any purpose—lighting, cooking, heating, or power—charged at 2s. net per 1000 c.ft.

This scheme has been devised by the Gas Committee to bring the advantages of gas for a large and increasing variety of purposes within reach of the business community of Halifax.

* This figure represents the amount of gas sufficient for lighting purposes when the new type of inverted incandescent gas-burner is used.

A Faulty Gas-Bracket.—"Gas poisoning" was the verdict returned by a Belfast Coroner's Jury in relation to the death of Andrew T. Lyttle, who was found dead in bed. It was shown in evidence that a gas-bracket in the room was loose, and that the gas was found almost full on.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The market opened the week with a very firm tone, which was maintained practically throughout, though on one or two days in the middle there appeared to be rather fewer inquiries than usual. There has, however, all along been a sufficient supply of tonnage available, and the demand all round has been such as to cause contractors in most cases to keep collieries fully supplied with orders. This is about all that is required to keep the market firm for the remainder of this year, as collieries generally are well sold—at any rate, for that period. Colliery quotations are thus maintained at previous levels, best gas and specials asking 24s. to 24s. 6d. f.o.b., and seconds 22s. 6d. to 23s. 6d.

Sellers continue to take an optimistic view of the future, and, generally speaking, their ideas are still anything up to 2s. 6d. above those of would-be buyers abroad. Chief interest in Durham unscreened for next year has been centred in coking coals, and several transactions in these have been carried through at 23s. 6d. for good qualities. In most cases, however, this has been speculative merchant business, the coal not having been placed with actual consumers. Collieries will not commit themselves to large quantities of any sort at this price, nor, in most cases, for periods beyond the end of June. They are still asking current prices for best gas for next year, *i.e.*—24s. to 24s. 6d.—and mostly do not appear anxious to contract even at this figure.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

There appears to be a temporary lull in orders for house coal in Yorkshire and Lancashire, possibly due to the mildness of the weather and the fact that orders were rushed in during the latter days of September in anticipation of the advances which producers generally made as from Oct. 1. It is not yet a decided opinion that these advances will remain good after a few weeks' trial, though collieries report little or no stocks.

The industrial section does not show any improvement; rather the reverse in view of the indecisive conferences which have recently taken place between the French and the British Governments in respect of the Ruhr situation. Even if a settlement was made within the next two or three weeks, the opinion is that it would be as many months before it affected the trade of this country.

There are a few belated inquiries for gas coal for inland consumption, though, as previously reported, the majority of the works bought one or two months ago to cover their requirements up to April, May, or June.

Shipping is rather dull at the moment, probably due to the uncertainty of the nearer European exchanges. This is also borne out by the fact that the congestion recently experienced in the Humber ports is much relieved. Germany are not buying to any increased extent, while deliveries to France and Belgium are rather below the normal.

Furnace coke is weaker, but gas coke has appreciated. The Continental demand seems to be mainly for washed nuts.

The programme in regard to miners' wages, recently discussed after a speech by Mr. Walsh, is one that is occupying the attention of the coal trade at the present time; but the matter is in its infancy, and, generally speaking, traders prefer to leave it alone for a few weeks in order to see how it develops. These things, however, create an atmosphere of uncertainty which is not conducive to forward business.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

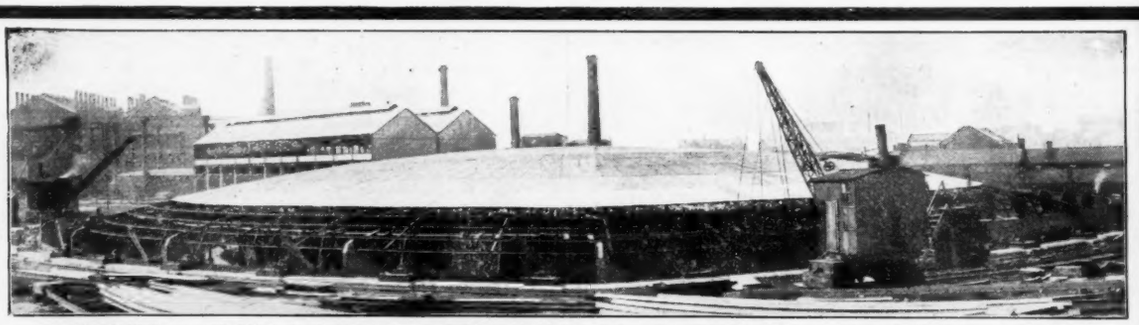
Work is proceeding steadily at most of the pits in the Midland area; but inequality of earnings is still apparent. In some cases the difficulty of making ends meet does not become less. With regular market conditions the output is taken up in most branches. The depression in the iron trade tells heavily against South Staffordshire collieries, which depend primarily on the local industrial consumption; but in recent weeks there has been some improvement in this respect, and the announcement that development works are to be intensively promoted has created a more hopeful feeling. An inadequate demand for slacks is again disturbing the balance of trade. At some of the collieries slacks have been loaded up faster than they could be disposed of. This is causing some inconvenience in the movement of other classes of fuel through local shortages of trucks. It has also weakened the price position as regards slacks. In order to avert any improvement of district values, collieries that are overburdened have been willing to make concessions to merchants who can find openings for odd lots further afield.

There is a good demand for best household coals. As regards the lower grades, the yard trade is helping to compensate for backwardness in the industrial demand.

No new feature has emerged so far as supplies to gas-works are concerned. Deliveries against contracts are being regularly accepted.

Foundry cokes are easier. The position with reference to smelting cokes for Midland blast-furnaces is to be reviewed again between now and November. Furnace owners experience no difficulty to-day in getting all the coke they want at the price arranged at the beginning of the present month—24s. at ovens.

Haslemere Gas Capital Over-Subscribed.—We learn from Messrs. A. & W. Richards that the recent issue of £5 6 p.ct. redeemable preference shares of the Haslemere and District Gas Company (advertised by them in the "Journal") was over-subscribed. The tenders ranged from £6 per share down to the minimum of par.



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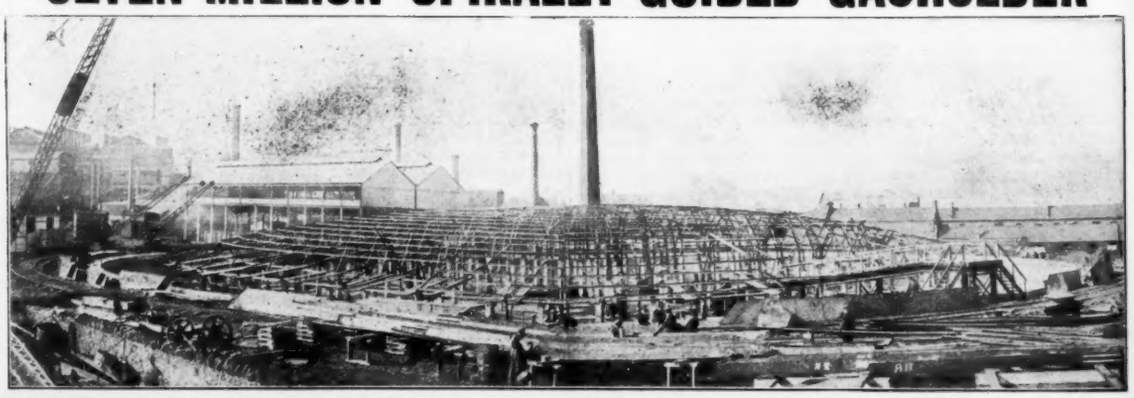

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TRADE NOTES.

Concrete Lined Cast-Iron Pipes.

To their already numerous list of activities, the Staveley Coal and Iron Company, Ltd., of Chesterfield, have recently added the lining of cast-iron pipes with concrete. An order has been received by them from the Chesterfield Corporation for a number of these pipes.

Small Brass Fittings, &c.

A new catalogue is being issued by Messrs. J. & W. B. Smith, Ltd., of Farringdon Road, London, E.C., of small brass fittings and plumbers' brasswork, gas, steam, and water barrel and fittings, and malleable fittings. The range of these goods included in the list is a very wide one.

A New Catalogue.

An extensive publication has been issued by Messrs. Falk, Stadelmann & Co., Ltd., of Farringdon Road, E.C. 1. Containing over 250 pages, and bearing the title "Light and Heat with Gas," it makes a comprehensive list of their many gas appliances. This catalogue will be posted to the firm's clientele, to whom, as to many others, it will be most useful. Together with this list, they have also published a "Veritas" catalogue (No. 502), which comprises a full list of mantles, burners, and glassware manufactured by the firm.

The Magnall-Irving Thrust-Borer.

From the Hydraulic Engineering Company, Ltd., we have received their latest descriptive catalogue of the Magnall-Irving thrust-borer. This publication explains the system at length; and the letterpress will well repay study. The system of thrust-boring is now an established practice; and the limitation of its use in consequence of ground conditions unsuitable for thrust-boring is a small factor when compared with the vast field in which its application is possible. When it is considered that a high percentage saving may be made by thrust boring where excavation costs are low and reinstatements practically *nil*, it will be realized how great the saving may be under the modern road surface built on concrete. The repeat orders received by the firm are in themselves significant of the all-round utility of the system.

Gas-Workers' Wages at Ashbourne.—The Ashbourne Urban Council Gas Committee having recommended certain reductions in the wages of the men employed at the works, Mr. Rose moved that the matter be referred back. He said that, though the Committee were justified in making the recommendation, he did not think the gasmen should be paid at a lower rate than the roadmen. The proposed reduction kept the wages of the gasmen within the recognized trade union standard; but they were paid 11d. or 1s. per hour, while the roadmen received 1s. 0½d. The gas workers were entitled to at least as much money as the roadmen. The resolution to refer the recommendation back to the Committee was carried.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 22.

In the London market there is an increasing demand for pitch for both prompt and forward delivery, and the price is reported as not below 137s. 6d. in bulk at makers' works. Creosote is unchanged at 9¾d. With regard to other products, there is nothing of fresh interest to report.

Tar Products in the Provinces.

Oct. 22.

The average values for gas-works products during last week were: Gas-works coal tar, 79s. to 84s. Pitch, East Coast, 135s. to 137s. 6d. f.o.b. West Coast—Manchester, 130s. to 132s. 6d.; Liverpool, 131s. to 133s. 6d.; Clyde, 132s. to 135s. Benzole 90 p.c.t., North, 1s. 0½d. to 1s. 1d.; crude 65 p.c.t. at 120° C., 9½d. to 10d. naked at makers' works; 50-90 p.c.t., naked, North, 1s. 5d. to 1s. 7d. Toluole, naked, North, 1s. 5d. to 1s. 7d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 4d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8d. to 8¾d.; salty, 7½d. to 8d.; Scotland, 6¾d. to 7¼d. Heavy oils, in bulk, North, 8½d. to 9d. Carbolic acid, 60 p.c.t., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.c.t., purely nominal; "B" unsaleable.

Manchester District Tar Prices.

Our correspondent for tar prices from the Manchester district writes: I have now obtained the information that was necessary to complete the price of tar, according to the sliding scale, for the Manchester District, and have pleasure in giving same as follows:

	Per Ton. £ s. d.
July	5 9 7·71
August	5 7 9·26
September	5 5 2·92

Gas Exhibition at Batley.—Under the auspices of the Batley Corporation Gas Department, an exhibition of domestic and other gas-appliances was opened at the Batley Town Hall last Wednesday week. Mr. R. H. Duxbury, the Corporation Gas Engineer, invited five firms to take part in the exhibition, stipulating that each should make a special feature of the appliances on which the firm had built up its own reputation. All appliances sold during the exhibition were supplied by the Corporation at cost price, and fixed free up to 20 ft. of piping. The exhibition was opened by the Mayor (Councillor H. Crothers) in the presence of a large gathering of people. A noteworthy feature was the lectures on gas cooking by Mr. R. Gamble Marks.

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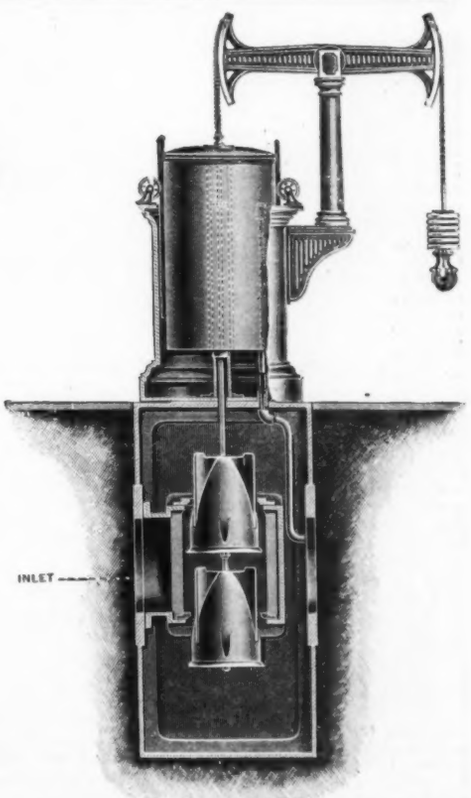

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THE MODERN GAS-GRATE.

Under the auspices of the Tottenham District Light, Heat, and Power Company, an interesting lecture was delivered to the staff, showroom assistants, inspectors and fitters, by Mr. Frank Harvey (Chemist on the staff of Radiation Limited) on the subject of "Improvements in the Modern Gas-Grate." The chair was taken by Mr. S. B. Chandler.

The lecturer dealt ably with the untiring efforts in research work in recent years tending towards perfection of the gas-fire. He showed how difficulties had been overcome, till the present modern "Radiation" gas-grate compared very favourably with any other form of domestic heating. It was not too much to say that greater progress had been made in gas-grates than in any other form of gas apparatus. From both the consumers' and gas undertakings' points of view, he placed the efficiency of the fires first; and the question of hygiene was closely bound up with this. The reduction in the percentage of convected, in favour of radiant, heat was a valuable feature of the present Radiation gas-fires; the figures being 20 p.ct. and 60 p.ct. respectively. The old type of gas-fire reversed these figures, sending 40 or 50 p.ct. of their heat up the chimney, and leaving only some 25 or 30 p.ct. to be emitted as radiant heat. Users of Radiation gas grates could be assured that they got the best value per therm, irrespective of other virtues—viz., cleanliness, efficiency, labour-saving, &c. The importance of the combustion products being carried completely away by the flue, could not be over-estimated. The old idea of the bowl of water placed before the gas-fire was due to the high percentage of convected heat given off by the old types. The water helped to some extent to add to the moisture content of the air. In a few cases, a bowl of water is still to be seen; but, with the present-day gas-grate properly fixed, this is totally unnecessary.

One of the most interesting parts of the lecture was that in which the ingenious principle of the Radiation patent "injector-ventilator" was outlined. The canopy of the fire is constructed with one passage to carry away the combustion products, and another properly-proportioned passage for ventilation. This latter carries away a large quantity of air, and changes the air of the room several times in an hour. The ascending current of combustion products through the lower passage promotes, by injector action, the ventilating functions in the outlet above. This feature has undoubtedly gone a long way towards bringing gas-fires favourably to the notice and recommendation of the medical profession.

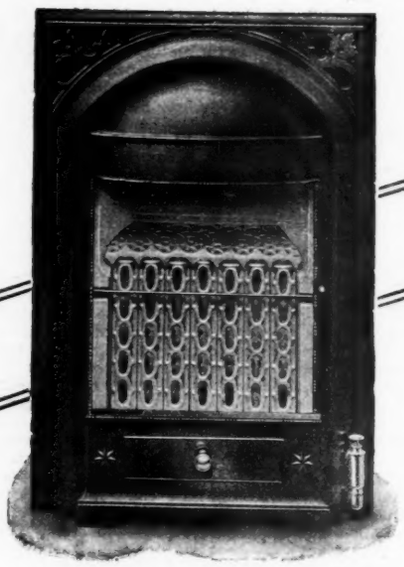
Centenary Celebration at Burnley.

In celebration of the hundredth anniversary of the Burnley Corporation Gas-Works, the Committee entertained the employees at a tea and social. About 360 were present. Mr. J. P. Leather (the Engineer and Manager) presided over the concert, and was supported by Alderman H. Emmott, J.P. (Chairman of the Gas Committee), and Mr. J. H. Clegg (Deputy Gas Engineer). Mr. Leather said it was 35 years since the employees last met together; and the room which at that time held all the Corporation employees was barely sufficient now for the employees from the gas-works only. Alderman Emmott remarked that, since his first connection with the Council in 1895, his greatest interest had been the Gas Committee. The gas-works had been carried on for a hundred years, and had done very well, considering the difficulties they had had to contend with. Up to 1914, the undertaking was looked upon as the hen that laid the golden eggs; but when the price of gas increased through the rise in the cost of coal, people began to complain of bad and dear gas. They would be at the present works for some time yet; but new works were to be erected at Stoneyholme, where an effort would be made to have everything up to date. The men would be considered, and would work under conditions as healthy and comfortable as possible. He hoped that Mr. Leather would be the man appointed to carry out the work. A vote of thanks to Alderman Emmott and the Gas Committee was carried, on the proposition of Mr. W. Copstick (carbonizing foreman with 50 years' service), seconded by Mr. S. Davis (chief clerk with 43 years' service). The concert was taken part in by the oldest employee, Mr. C. Stubbs, who is aged 73, and has been at the gas-works for 53 years.

Hemel Hempstead Capital Issue.—Instructions have been received from the Directors by Messrs. A. & W. Richards, to offer for sale by tender (minimum price par) £13,000 of 6 p.ct. irredeemable preference capital in the Hemel Hempstead District Gas Company. The issue will comprise 300 shares of £10 each and £10,000 of stock. There is a steadily growing demand for gas throughout the Company's district, the sales having increased by 3½ p.ct. last year. Extensions of works and mains are necessary to meet this demand; and it is to pay for these extensions that the present issue of capital is being made. Tenders must be sent in to Messrs. Richards, at No. 37, Walbrook, London, E.C. 4, not later than 11 o'clock to-morrow (Thursday) morning.

Twinlight Burners, Ltd.—An application was made at the London Bankruptcy Court on Friday for the discharge of Charles Bucknam Kendall, described as of the Wool Exchange, E.C., and residing at No. 44, Maryland Square, Stratford, E. 15. The Official Receiver reported that a Receiving Order was made against the debtor in January last on a creditor's petition. The liabilities expected to rank for dividend were estimated at £4026, and no available assets were disclosed. Debtor came to this country from America in 1887, and in 1909 he assisted in the formation of a company called "Twinlight Burners, Ltd.," with a view to the exploitation of a patented gas-burner in which he had acquired an interest. However, the invention was not a success, and the Company, of which he became a Director, was now moribund. He attributed his failure to his earnings having been insufficient to meet his household and personal expenses, and to interest on loans. The only offence alleged against the debtor was that his assets were not equal to 10s. in the £ on the amount of his unsecured liabilities. The Registrar suspended the discharge for the nominal period of three weeks.

By Appointment.



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STOCK MARKET REPORT.

THERE was very little animation on the Stock Exchange when business opened last week, and only high-class investments were continuously in demand, more particularly in the case of the new Colonial script. Mining, Tea, and Oil shares were well supported; but Rubbers were dull. Although the prospects of the 4 p.ct. Nigerian Loan issue were not promising, it was not expected that the underwriters would be called upon to take up 92 p.ct. of their commitments.

The effect of the "inflation" rumours, to which we referred last week, was still noticeable in the City on Monday; but it was speedily dissipated by Sir Montague Barlow's statement the following day, that the Government had no intention of making any change in their financial policy.

Transactions in the Gas Market were uneventful. As our readers are aware, the quotations of gas stocks and shares, although they have recovered from the stagnation brought about by the war, and which continued until the end of 1921, are still below the pre-war level. The improvement which was very rapid in 1922 has been moderate during the past twelve months. This is illustrated by a comparison of the quotations of the three Metropolitan Companies' stocks:

	Oct., 1921.	Oct., 1922.	Oct., 1923.
Gas Light and Coke	57–60	93–97	95½–97½
South Metropolitan	67–70	94–97	97½–99½
Commercial	54–57	93–98	95–98

The possibility of a revision in the standard price of gas, however, with the consequent diminution in the authorized rate of dividend, will doubtless militate against any further improvement in the immediate future.

Changes took place in the quotations of the following: Brentford 5 p.ct. preference, Cape Town, South Shields, Wandsworth "A," "B," and "C," Wimbledon 5 p.ct., and Epsom 5 p.ct. advanced. Alliance and Dublin, Continental Union, Hong Kong *ex* div., Imperial Continental, Sheffield "A" and "B," and South African *ex* div. were marked down.

The following transactions were recorded on the London Stock Exchange during the week: On Monday, Alliance and Dublin ordinary 70½ *ex* div., Brentford "A" 102½, "B" 101½, 5 p.ct. preference 85, Commercial 4 p.ct. 95½, 97, 3½ p.ct. 96½, 96⅝, Continental Union 30, European 8¼, 8⅜, 8 11/16, 8½, Gas Light and Coke 95¾, 95⅞, 96, 96⅛, Imperial Continental 157, 158, 3½ p.ct. debenture 76½, 78, Liverpool 7 p.ct. preference 106, Oriental 101, Primitiva 6s., South Metropolitan 99, 99½, 3 p.ct. debenture 62, 6½ p.ct. debenture 106½, Swansea 7 p.ct. preference 103½, 104. Supplementary prices, Colonial 15s. 9d., 16s., 7 p.ct. preference 16s., Wandsworth New 3½ p.ct. 103. On Tuesday, Alliance and Dublin 71, 71¼ *ex* div., Brentford "B" 102½, Commercial 4 p.ct. 96, Gas Light and Coke 95⅞, 96, 96⅛, 96⅝, Imperial Continental 155, 156, 158, Portsea Island "D" and "E" shares 82, Primitiva 6s., 5 p.ct. preference 27s. 6d., South Metropolitan 98½, 99, 6½ p.ct. debenture 107, Southampton 89, Swansea 7 p.ct. preference 103. Supplementery prices, Wandsworth 3½ p.ct., New 102½, 103. On Wednesday, Alliance and Dublin 69, 71 *ex* div., Cape Town 7⅜, Commercial 4 p.ct. 95½, 96½, Continental Union 30, European 8 5/16, 8⅜, 8 13/16, Gas Light and Coke 95⅝, 96⅛, 96½, 3½ p.ct. maximum 66½, 66⅝, 66⅞, Imperial Continental 157½, 158½, Liverpool 7 p.ct. preference 106½, Primitiva 5 p.ct. preference 28s., South Metropolitan 98½, 99, South Suburban 5 p.ct. debenture 99, 99½, Swansea 7 p.ct. preference 103, 103⅜, 6½ p.ct. debenture 105½. Supplementary prices, Barnet "C" 105½, South Suburban 7 p.ct. debenture 104, 105, Wandsworth 4 p.ct. debenture 78. On Thursday, Alliance and Dublin 70, Commercial 4 p.ct. 96, European 8¼, 8⅜, Gas Light and Coke 95¾, 95⅞, 95⅞, 96, 96¼, 96½, 3½ p.ct. maximum 66½, 4 p.ct. consolidated preference 81½, 3 p.ct. consolidated debenture 62⅜, Imperial Continental 157, 158, Montevideo 49, 49½, 50, Oriental 102, Primitiva 6s., 5 p.ct. preference 27s. 6d., 4 p.ct. (Buenos Ayres) new debenture 57, 57⅛, S. Barracas (Buenos Ayres) 1¾d., 2d., Swansea 7 p.ct. preference 103⅜, Wandsworth "C" 103. Supplementary prices, Cardiff 99½, South Suburban 7 p.ct. debenture 105, Wandsworth 4 p.ct. debenture 80. On Friday, Alliance and Dublin 70½, 72, Brentford "B" 102½, Commercial 4 p.ct. 95⅞, 96½, 97, 3 p.ct. debenture 61½, European 8⅛, 8⅜, Gas Light and Coke 95⅝, 96⅛, 96½, 3½ p.ct. maximum 66⅜, 66⅝, 4 p.ct. consolidated preference 80½, Imperial Continental 157½, Primitiva 5s. 6d., South Metropolitan 98½, South Suburban 101, Swansea 6½ p.ct. debenture 106, Tottenham "B" 102½. Supplementary prices, Southend 5 p.ct. consolidated 92, 5 p.ct. new 91, 91½.

In the Foreign Exchange market German news had an unfavourable effect on the "Reparation" exchanges. Marks reached the fantastic figure of 40-60 milliards to the pound. The outstanding feature, however, was a fall from $4 54½c. to $4 52⅝c. in Sterling on New York as compared with Friday of the previous week.

In the Money Market there was a keen demand for loans at the beginning of the week; but, as is usual, rates were easier on Friday afternoon, and accommodation could be secured at 2½ p.ct. as money became more plentiful.

Silver closed at 31½d. per oz. after slight fluctations during the week, a fall of ¼d. on the week.

The Bank of England rate remains at 4 p.ct., to which figure it was raised from 3 p.ct. on July 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Divid. at Rate of	NAME.	Closing Prices, July 30, 1914.	Variation. Quotations, Oct. 19.	Variation. Lowest and Highest Prices of Transactions.
£			p.c.	% p.a.				
131,978	Stk.	Aug. 9	—	5	Aldershot 5 p.c. max. C.	..	72—77	...
217,992	,,	,,	4	4	Do. 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Oct. 4	2½	5	Alliance & Dublin Ord.	59—64	68—73	69—72
574,000	,,	July 12	4	4	Do. 4 p.c. Deb.	76—79	62—67	...
280,000	5	Oct. 18	7½	8	Bombay, Ltd.	5⅛—6⅛	5⅜—5⅝*	...
100,000	10	Aug. 9	16	8½	Bournemouth Gas and Water { B 7 p.c.	..	11⅜—12⅜	...
383,110	10	,,	7	7	{ Pref. 6 p.c.	15—15⅛	11⅜—12⅜	...
115,000	10	,,	6	6	{ 4 p.c. Deb.	13½—14	10⅜—11⅜	...
162,025	—	June 28	—	4	Brentford A Consolid.	..	77—82	102½
992,045	Stk.	July 12	14	6 6/7	Do. B New	261—266	100—105	101½—102½
734,920	,,	,,	11	6½	Do. 5 p.c. Pref.	204—209	100—105	85
55,000	,,	,,	5	5	Do. 4 p.c. Deb.	109—111	93—95	...
221,400	,,	June 14	4	4	Brighton & Hove Orig.	91—93	77—82	...
214,745	,,	Aug. 23	11	11½	Do. A Ord. Stk.	208—213	171—176	...
244,200	,,	,,	8	8½	Bristol 5 p.c. max.	154—159	127—132	...
1,287,500	Stk.	July 26	5	5	British A Ord.	..	95—96 B.	...
370,000	20	Oct. 4	12½	10	Do. 7 p.c. Pref.	44—45	..	...
100,000	10	June 28	—	7	Do. 4 p.c. Deb. Stk.	..	..	...
120,000	Stk.	,,	4	4	Cape Town & Dis., Ltd.	88—90	75—80	7⅜
100,000	10	May 17	—	7	Do. 4½ p.c. Pref.	1⅜—2⅜	6—7	...
100,000	10	May 3	—	4½	Do. 4½ p.c. Deb. Stk.	4—6	75—80	...
150,000	Stk.	June 28	4½	4½	Cardiff 7½ p.c. Deb.	70—75	106—111	...
237,860	,,	,,	—	7½	Chester 5 p.c. Ord.	..	..	...
157,150	,,	Feb. 26	5	5	Commercial 4 p.c. Stk.	108—110	..	95½—97
1,513,280	,,	July 25	5/9/4	6	Do. 3½ p.c. do.	106—108	95—98	96½—96⅝
560,000	,,	,,	5½	6	Do. 3 p.c. Deb. Stk.	103—105	93—98	61½
475,000	,,	June 14	3	3	Continental Union, Ltd.	69½—71½	60—64	30
800,000	,,	14 Jan. 15	4	—	Do. 7 p.c. Pref.	76—79	28—33	...
800,000	,,	Dec. 14	7	4	Croydon sliding scale.	115—118	72—77	...
660,000		Aug. 9	—	6½	Do. max. div.	..	101—104	...
284,975		,,	—	5	Derby Con. Stk.	..	81—85	...
492,270	Stk.	,,	6	4½	Do. Deb. Stk.	123—125	..	...
55,000	,,	,,	—	4	East Hull 5 p.c. max.	102—104	..	...
809,000	,,	Oct. 4	6	5	European, Ltd.	..	..	8½—8⅝
1,002,180	10	July 12	—	5	{ 4 p.c. Ord	17⅛—18	8—9	95⅛—96⅛
16,546,120	Stk.	July 26	10	5½	Gas { 3½ p.c. max.	95—102	95¼—97⅛	66⅛—66⅜
2,600,000	,,	,,	1/17/4	3½	Light { 4 p.c. Con. Pref.	76—79	65—68	80⅛—81⅛
4,062,235	,,	,,	3¼	4	and { 3 p.c. Con. Deb.	96—99	80—83	62½
4,761,930	,,	June 14	4	3	Coke { 10 p.c. Bonds	72⅛—74⅛	61—64	...
130,000	,,	Dec. 11	3	10	{ 7½ p.c. Ilford Deb.	..	..	...
42,000	—	,,	—	7½	Hastings & St. L. 5 p.c.	..	93—98	...
82,500	,,	Sept. 19	5	6⅔	Do. 3½ p.c.	87—89	78—83	...
258,740	,,	,,	3½	5½	Hongkong & China, Ltd.	16½—16⅝	15—16*	...
70,000	10	Oct. 18	11	10	Hornsey 7 p.c.	..	144—149	...
86,600	Stk.	Aug. 23	9	9½	Imperial Continental	150—160	155—160	155—158½
1,976,000	,,	May 31	9	9	Do. 3½ p.c. Deb. Red.	84—86	76—78	76½—78
401,400	,,	Aug. 9	3½	3½	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
235,242	,,	,,	6½	6½	Liverpool 5 p.c. Ord.	..	..	...
1,127,240	,,	Feb. 26	10	5½	,, 7 p.c. Pref.	..	104—107	106—106½
600,000	,,	Sept. 19	—	7	Maidstone 5 p.c.	..	104—109	...
165,736	,,	Aug. 23	7/5/6	9	Do. 3 p.c. Deb	..	52—57	...
63,480	,,	June 28	—	—	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	4½—4⅝	3⅛—4	...
75,000	5	June 14	6	7		99—101	95—96*	...
50,000	100	Oct. 1	4½	4½	Montevideo, Ltd.	..	49—54	49—50
541,920	Stk.	May 17	4	4	Newcastle & Gateh'dCon.	11⅛—12	83⅛—84⅛N.	...
1,875,892	,,	July 26	4½	4½	Do. 4 p.c. Pref. Stk.	98⅛—99⅛	74⅛—76⅛N.	...
250,166	,,	Aug. 9	—	4	Do. 3½ p.c. Deb.	..	71—73 N.	...
289,705	,,	June 28	3½	3½	North Middlesex 10 p.c.	82—83	16⅛—17⅛	...
15,000	10	Aug. 23	—	11	,, 7 p.c.	..	11⅜—12⅜	...
75,940	10	,,	7/14/0	7 7/10	Oriental, Ltd.	14—15	97—102	101—102
300,000	Stk.	May 3	8	7	Plym'th & Stonh'se 5 p.c.	117—122	108—113	...
138,120	Stk.	June 28	—	7½	Portsea Island, B	..	100—105	...
60,000	50	Sept. 6	13	13	Do. C	128—131	97—102	...
100,000	50	,,	12	12	Primitiva Ord.	118—121	..	5/6—6/-
1,450,345	5	29 Oct. 14	8	—	Do. 5 p.c. Pref.	5½—6	¾—1	27/6—28/-
2,499,800	5	30 Dec. 15	5	4	Do. 4 p.c. Deb.	4⅜—5	1⅛—1⅜	...
341,400	100	June 1	4	4	Do. ,, ,, 1911	91—93	70—74	...
600,000	Stk.	July 26	4	4	Do. B. Aires 4 p.c. Deb.	..	56—59	57—57½
220,335	,,	June 28	4	4	Do. Riv. Pl. 4 p.c. Deb.	85—87	56—59	...
321,670	,,	,,	4	4	San Paulo { 6 p.c. Pref.	85—87	56—59	...
150,000	10	Oct. 4	6	6	{ 5 p.c. Deb.	104—11	5⅛—6*	...
125,000	50	July 2	5	5	Sheffield A	47—49	38—41	...
270,000	Stk.	Aug. 23	10	5	Do. B	223—234	99—101S.	...
419,968	,,	,,	10	5	Do. C	222—224	99—101S.	...
1,047,000	,,	,,	10	5	Shrewsbury 5 p.c.	220—232	99—101S.	...
133,401	Stk.	—	4	6	South African	..	..	...
90,000	10	Oct. 18	9	9	South Met. Ord.	10⅛—11⅛	7—9*	9⅛—99⅛
6,609,895	Stk.	July 26	5/9/4	5	Do. Red. Pref.	111—113	97⅛—99⅛	...
250,000	,,	July 12	—	3	Do. 3 p.c. Deb.	..	98—100	62
1,895,445	,,	,,	3	3	Do. 6½ p.c. Deb.	72⅛—74⅛	61—64	106½—107
734,000	,,	Sept. 6	—	6½	South Shields Con. Stk.	..	105—107	...
91,500	,,	Aug. 23	8½	8½	S'th Suburb'n Ord. 5 p.c.	157—159	134—136N.	101
1,087,795	,,	,,	6	6	Do. 5 p.c. Deb. Stk.	114—116	100—103	99—99½
368,837	,,	June 28	5	5	S'th'mpt'n Ord. 5p.c. max	116—118	95—100	89
647,740	,,	May 3	5	7	Do. 4 p.c. Deb. Stk.	99—102	88—91	...
121,275	,,	June 28	4	4	Swansea 7 p.c. Pref. Stk.	..	75—80	103—104
250,000	,,	Aug. 23	—	7	Do. 6½ p.c. Deb. Stk.	..	102—104	105½—106
200,000	,,	June 28	—	8	Tottenham District { A 5 p.c.	..	105—107	...
120,000	,,	July 26	6	6½	{ B 3½ p.c.	135—138	122—127	102½
782,875	,,	,,	4	4	{ 4 p.c. Deb.	115—117	100—105	...
181,355	,,	June 14	1	5	Tynemouth 5 p.c. max.	87—89	78—82	...
258,251	Stk.	Aug. 23			Wandsworth, Wimbledon, and Epsom—	108½—109	88—90 N.	...
30,000	..	July 12	8½	9	Wandsworth A 5 p.c.	151—156	135—140	...
235,636	,,	,,	6½	7½	Do. B 3½ p.c.	129—134	116—121	...
108,075	,,	,,	5/17/3	6⅔	Do. C.	110—115	100—105	103
140,865	,,	,,	—	6⅔	New Ordinary	..	..	102½—103
332,000	,,	,,	6½	7½	Wimbledon 5 p.c.	127—132	110—115	...
93,000	,,	,,	6½	7½	Epsom 5 p.c.	121—126	118—123	...
88,416	,,	June 28	3	3	5 p.c Deb. Stk.	66—69	57—60	...

B.—Bristol Exchange. N.—Newcastle Exchange. S.—Sheffield Exchange. * Ex div.

Co-Partnership at Bishop's Stortford.

At an extraordinary general meeting of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company, presided over by Mr. E. L. Burton (Chairman), a scheme of co-partnership for the Company's employees was adopted. Briefly, this is as follows: The scheme, which will date from Jan. 1, will be managed by a Committee consisting of the Manager, the Secretary, and four elected employees, together with an independent Chairman (who must be a Director of the Company, or such other person as may be nominated by the Board of Directors). The portion of the profits to be appropriated to the co-partners each half-year (or year), will be a sum equivalent to 7 p.ct. of the amount of dividends distributed to the stockholders for such half-year (or year); the portion of profits being charged to the revenue account as part of the expenditure incidental to the manufacture and distribution of gas, &c. The appropriation cannot be made until after the declaration of dividends, and will be distinct from, and not form any part of, the dividends. All profits appropriated must be invested in the ordinary stock of the Company (by purchase) in the names of the Chairman of Directors (or a Director to be appointed by the Board), and two elected co-partnership members; the stock being apportioned among the co-partners, and entered to the credit of each co-partner in the co-partnership books. The co-partnership stock cannot be sold, transferred, or alienated by the co-partners except (*inter alia*) upon one or more of the following grounds—viz., (1) death, (2) permanent ill-health or incapacity, (3) retirement upon reaching the age limit, &c. The profits allotted to the co-partners will not form any part of the wages payable, but will be additional to the full current rate of wages in force from time to time.

New Joint-Stock Company.—A Company with a capital of £100 has been registered under the title of Messrs. Mottram, Green, & Co., to carry on business as manufacturers, agents, and patentees of improved gas-heaters, &c. The offices are at Nos. 18-21, Charterhouse Square, London, E.C.

Thorncliffe Coke-Ovens.—In their third annual report, for the year ended June 30, the Directors of the Thorncliffe Coal Distillation Company, Ltd., state that satisfactory results have been achieved. At the present time the prices of both coke and bye-products show some weakness. After allowing for depreciation and taxation, the profit and loss account shows a profit for the year of £106,704. Deducting last year's deficit of £37,649 and dividends already paid on the preference shares for two half-years to Dec. 31, 1922, there remains a balance of £37,588, which the Directors recommend should be applied to the payment of a further dividend at the rate of 8 p.ct. per annum on the preference shares for the half-year ended June 30 and a dividend of 6d. per share, free of income-tax, on the ordinary shares. Placing to reserve account £11,666 will leave a balance of £354 to be carried forward. It is proposed to capitalize the reserve fund (which, with the present addition, will stand at £19,666), and distribute it as fully-paid ordinary shares of 1s. each, by way of bonus. This will be at the rate of one new ordinary share for each ordinary share at present issued.

Inspection of the Halifax Gas-Works.

On Oct. 17 the Halifax Gas Committee, together with some other members of the Corporation and representatives of local industries, made an official tour of inspection of the municipal gas-works, under the guidance of the Gas Engineer and General Manager (Mr. W. B. M'Lusky) and his deputy manager (Mr. C. D. Cawthra). Everything at the works was found satisfactory and highly efficient; and the company subsequently had tea in the Committee Room, under the Chairmanship of Alderman J. H. Waddington, Chairman of the Gas Committee. Sir Harold Mackintosh, proposing a toast to the Mayor and Corporation, said that, as a business man and a big advertiser, he had admired the way the gas industry had faced the severe competition of electricity during the past decade. In business many a problem which seemed to be serious turned out, if tackled properly, to be of great benefit, and he believed the gas industry had benefited greatly from the competition of electricity. The Mayor, replying, mentioned that the gas-works was the oldest undertaking of the Halifax Corporation; and the fact that it was controlled by men of business acumen was testified by a gross profit for the past year of £67,826, despite trade depression. This had been earned in the face of a reduction in the price of gas during the year by 1s. 1d. per 1000 c.ft. Bearing on the reduced price of coal, owing to the efforts of the Engineer, the Committee had launched out on a new scale of charges which, if universally adopted, would be the means of bringing gas into the houses of the people at so small a sum as 2s. per 1000 c.ft. This was to be attempted with the reasonable hope that by increased consumption the financial success of the undertaking would be maintained. During the existence of the Halifax Gas-Works nearly £400,000 had been given back to the people in relief of rates. Mr. H. Goodall, proposing "The Gas Industry," said he had calculated that, if the £400,000 contributed in relief of rates had been devoted to reduction of debt on the undertaking, the price of gas to-day in Halifax would have been 1s. 3d. per 1000 c.ft. He urged the utmost reduction in price, for the encouragement of commercial use and as an aid to elimination of the smoke evil. Alderman Waddington, responding, said the debt was a legacy from the former controllers, and he was proud of the altered policy of the Committee. They were the only Corporation Committee whose policy for the past fifteen years or so had been to refuse to expand the debt a single farthing. A toast to Mr. M'Lusky was given by Councillor W. Court, J.P.

Verticals for Renfrew.—A proposal to instal Woodall-Duckham vertical retorts at the gas-works was agreed to at the last monthly meeting of the Renfrew Town Council.

Thefts of Mantles.—At Dewsbury, last Thursday, Ernest Hall, general dealer, and Harold Marshall, wholesale general dealer, were each sent to prison for three months, in respect of the extensive thefts of gas-mantles (as reported in the "Journal" last week) from the warehouse of Messrs. R. Blackburn & Son, Tithebarn Street, Dewsbury. The total number of mantles involved in the charges, of stealing against Hall and receiving of some of the mantles on the part of Marshall, was 2282, value £59.

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GAS COOKERS, HEATING STOVES, &c.

Conditions and Form of Tender may be had on Application to the Engineer and Manager, Gas-Works, Belfast.

Tenders, which must be on Official Forms, endorsed "Tender for..... Gas Department," to be lodged in my Office not later than 5 p.m. on Thursday, the 1st of November, 1923.

The lowest or any Tender will not necessarily be accepted.

The whole or any part of a Tender may be accepted.

An Official Receipt must be obtained for every Tender delivered by hand. Tenders sent by post must be Registered.

Parties tendering must comply with the Council's Standing Orders relating to Wages, Hours of Labour, &c.

R. MEYER,
Town Clerk.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Corporation of Birkenhead are prepared to receive TENDERS for the Supply of approximately 15,000 Tons of SCREENED COAL, THROUGH and THROUGH COAL, NUTS, and SLACK, for Gas-Making purposes for the period ending June 30, 1924.

Forms of Tender, together with any further Information, may be obtained from the Gas Engineer, Gas-Works, Birkenhead.

Tenders, stating the price per Ton Delivered to the Gas Works Railway Siding, as per schedule embodied in Form of Tender, must be sent in to me, sealed and endorsed "Tender for Gas-Works Coal," not later than five o'clock in the afternoon of Monday, the 5th day of November, 1923.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
JAS. FEARNLEY,
Town Clerk.

Town Hall,
Birkenhead,
Oct. 19, 1923.

URBAN DISTRICT COUNCIL OF DENTON.

(GAS DEPARTMENT.)

THE above Council invite Tenders for the Supply of SCREENED GAS COAL, COBBLES, and NUTS suitable for Vertical Retorts, to be Delivered in the Council's Gas Works' Siding at Denton, near Manchester, on the London, Midland, & Scottish Railway, as and when required by the Council during the SIX MONTHS ending Sept. 30, 1924.

Tenders, endorsed "Coal" should be sent in to the undersigned not later than the 3rd of November, 1923.

The Council do not bind themselves to accept the lowest or any Tender, nor to Purchase the whole quantity required from any one person tendering.

H. C. HANDLEY,
Engineer and Manager.

Gas Works,
Denton, near Manchester,
Oct. 16, 1923.

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in the
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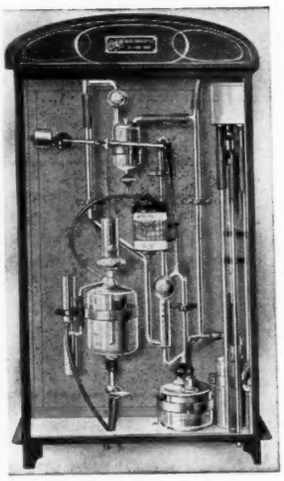

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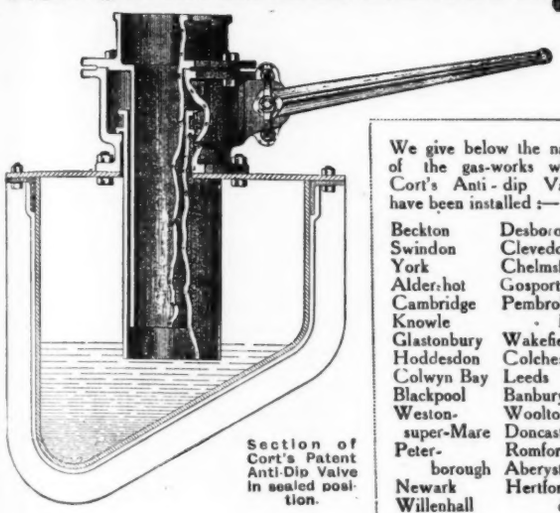

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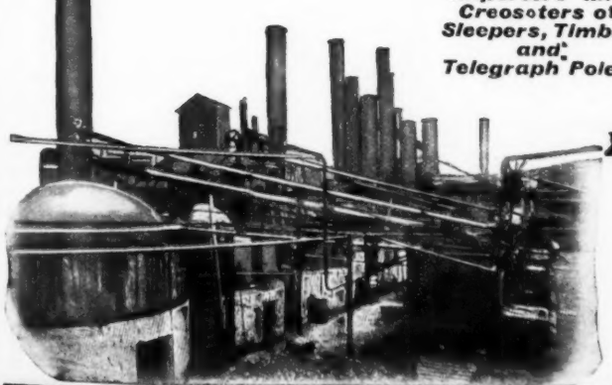

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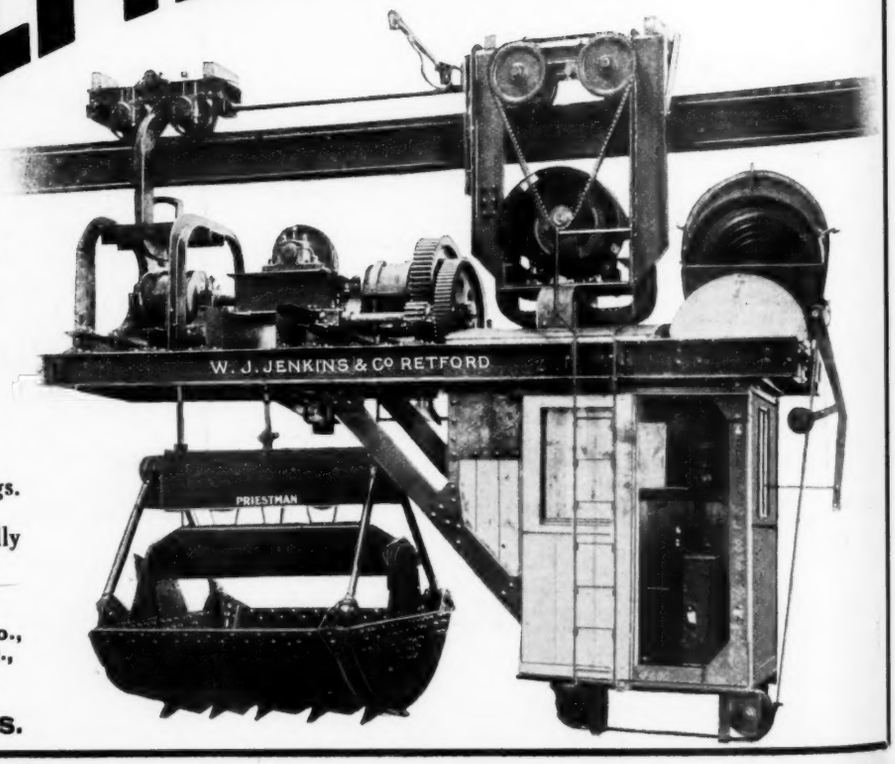

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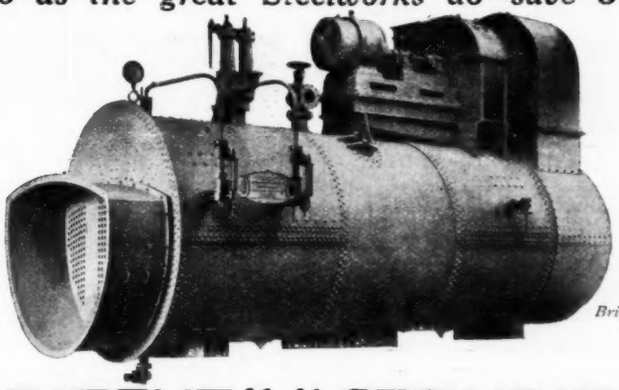

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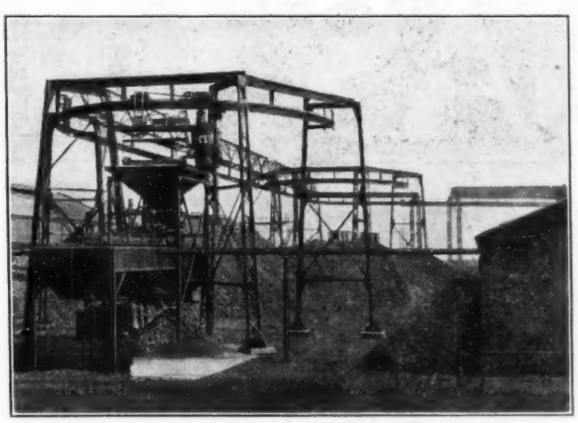

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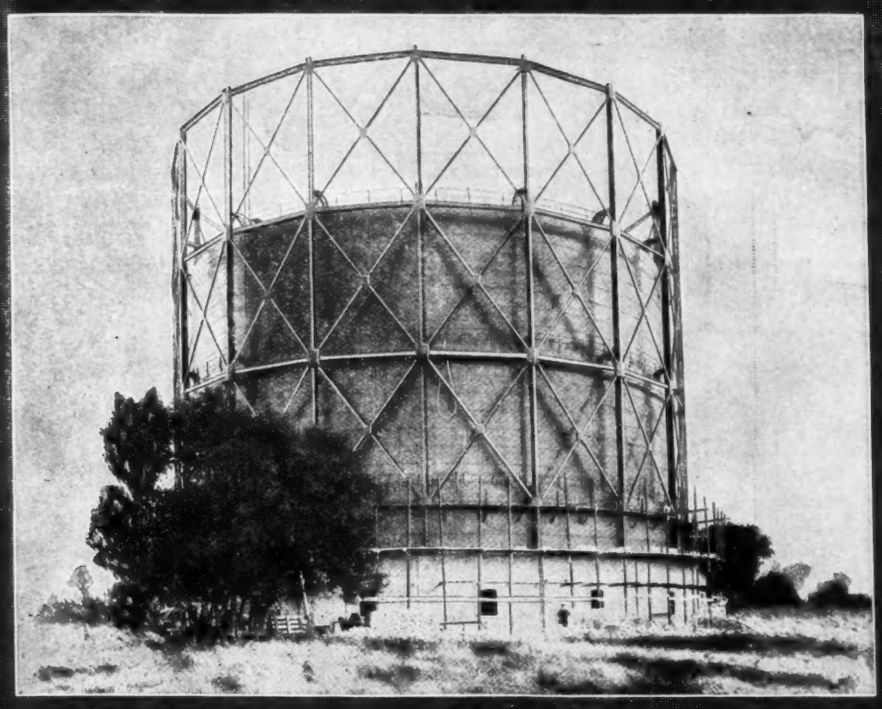

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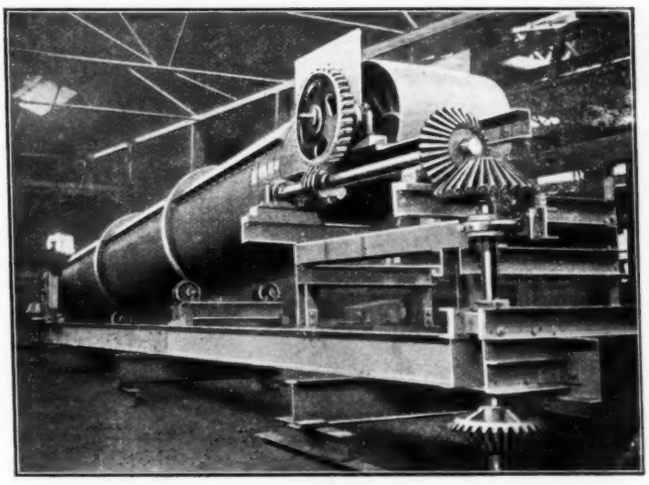

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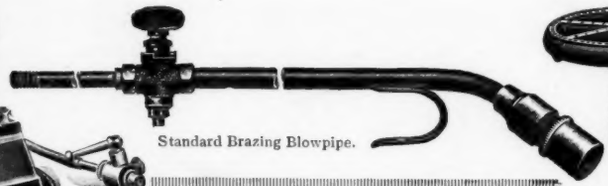
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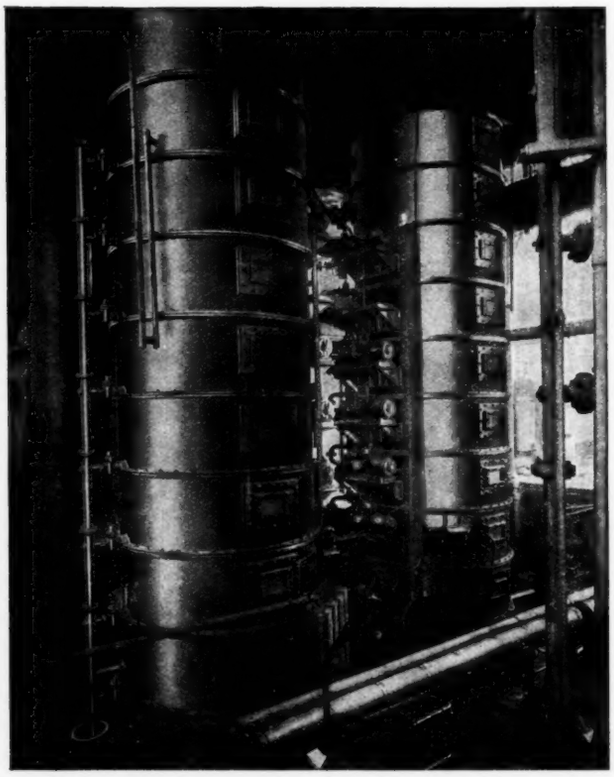

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